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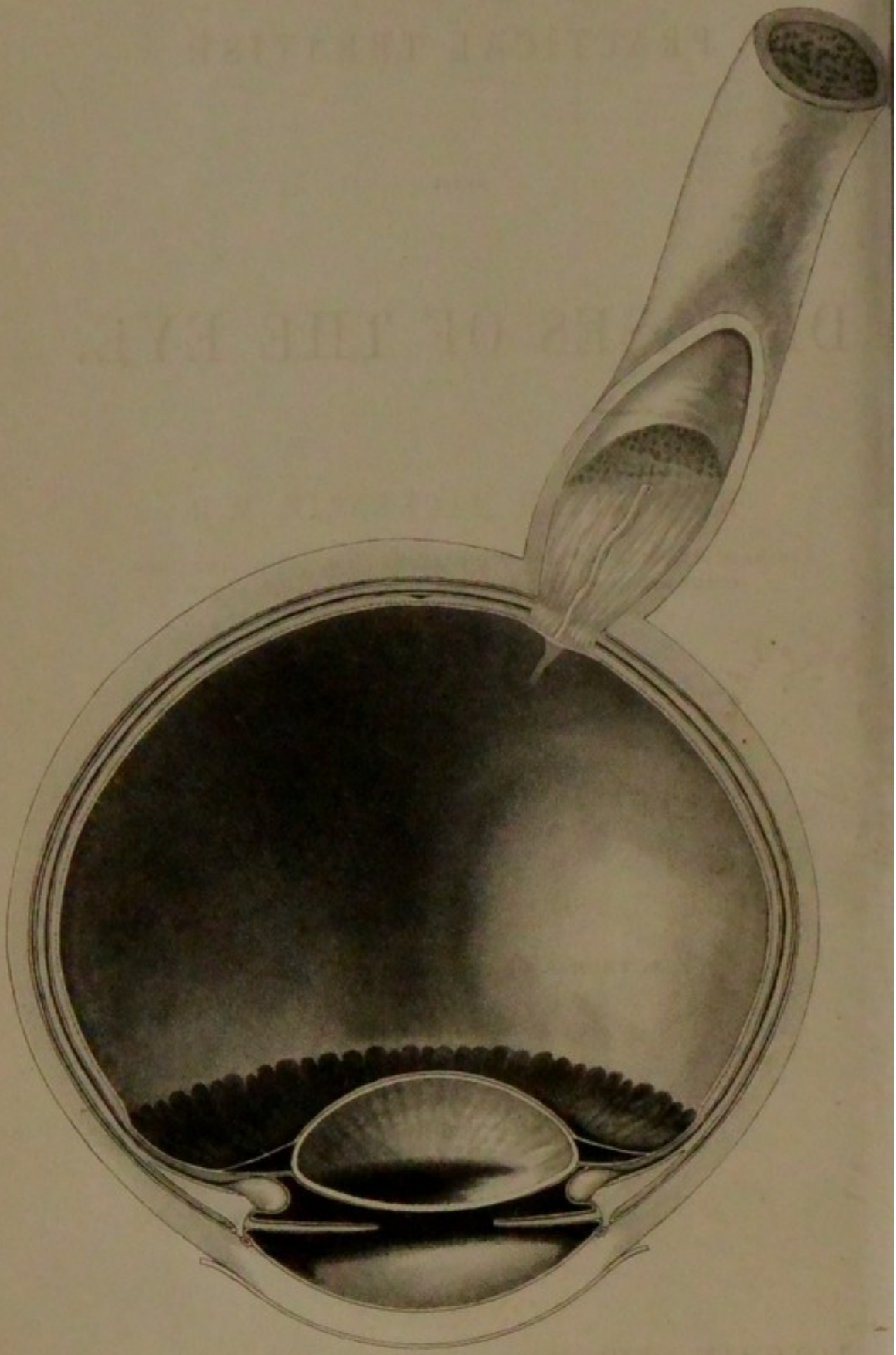
PRACTICAL TREATISE

ON THE

DISEASES OF THE EYE.



HORIZONTAL SECTION OF THE RIGHT HUMAN EYE.

(Magnified four Diameters.)

A

PRACTICAL TREATISE

ON THE

DISEASES OF THE EYE.

BY WILLIAM MACKENZIE, M.D.

SURGEON OCULIST IN SCOTLAND IN ORDINARY TO HER MAJESTY, LECTURER ON THE EYE IN THE UNIVERSITY OF GLASGOW, AND ONE OF THE SURGEONS TO THE GLASGOW EYE INFIRMARY.

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TO WHICH IS PREFIXED

AN ANATOMICAL INTRODUCTION

EXPLANATORY OF

A HORIZONTAL SECTION OF THE HUMAN EYEBALL.

By THOMAS WHARTON JONES, Surgeon.

Third Edition.

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ADVERTISEMENT TO THE THIRD EDITION.

The demand for this *Treatise on the Diseases of the Eye* has been much greater than the author had any reason to expect. Since its first appearance, two large editions have been exhausted; it has also been reprinted at Boston in America, and a German translation of it has been published at Weimar.

In the present edition, new matter, which would have extended to about 140 pages of the second, has been added; but, by enlarging the page, the work has been kept within its former bounds. The whole has again been carefully revised, and such alterations made as have been suggested by the author's continued experience, or by his perusal of the writings of others. He trusts that it will be found, that, on every occasion, he has endeavoured to treat his fellow-labourers in the same field with becoming deference and perfect fairness; never appropriating to himself the labours and improvements of others, but acknowledging openly what he has borrowed.

His friend, Mr T. Wharton Jones, has revised his *Horizontal Section of the Eyeball*, and *Anatomical Introduction*, comprehending in the latter the most recent discoveries in the anatomy of the eye. Mr Jones has also furnished drawings for a number of new wood-cuts in the body of the work, for which, as well as for various practical hints from him and several other medical friends, the author takes this opportunity of returning thanks.

68, *George Square, Glasgow,*
10th October, 1839.

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ANATOMICAL INTRODUCTION

EXPLANATORY OF A

HORIZONTAL SECTION OF THE HUMAN EYEBALL.

BY THOMAS WHARTON JONES.

[The numbers (1) (2) (3) &c. refer to the horizontal section.]

§ i. The human eyeball is nearly spherical in form, the antero-posterior diameter or axis (*a*, *b*, *Fig.* i.) being in general equal to the transverse diameter (*c*, *d*), both measured from the outside. The average length of these diameters is about 19-20ths of an English inch.

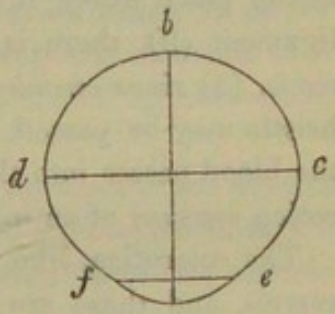

Fig. i.

§ ii. The strong outer tunic of the eyeball consists of the *sclerotica*, which is opaque, and the *cornea*, which is transparent—the window as it were of the organ. Though the surfaces of these two parts are not strictly spherical, still it may be allowable to state, in a general way, that the sclerotica is a large segment of a larger sphere, and the cornea a small segment of a smaller sphere. The diameter of the larger sphere or that formed by the sclerotica, is the same as of the eyeball in general, above mentioned (§ i). The radius of the convexity of the cornea is about 13-40ths of an inch.

§ iii. In consequence of the difference in the convexity of their surfaces, the sclerotica and cornea have to deviate strikingly from the spherical form in order to meet each other. The sclerotica, at the line of junction, bends slightly towards the axis of the eyeball; the cornea in an opposite direction. An annular depression is thus created round the cornea.

§ iv. The eyeball consists of four classes of parts:—1st. The protective parts, or tunics. 2d. Parts subsidiary to the perfection of the eye as an optical instrument; *viz.* the iris, which is a diaphragm for correcting the aberration of sphericity, and the black pigment, which serves to absorb the rays of light. 3d. The specially sensitive parts; *viz.* the optic nerve and the retina. 4th. The dioptric parts, refractive media, or lenses.

I. Protective parts or Tunics of the Eyeball.

§ v. In a horizontal section of the eyeball, 5-6ths of the circumference of the section are formed by the *sclerotica* (1), and the remaining 6th by the *cornea* (4). The sclerotica is a strong resisting fibrous membrane. Its outer surface is marked with the insertions of the muscles of the eyeball, and presents small orifices for the passage of blood-vessels and nerves, into or from the interior of the eye. Its inner surface is lined (5) by a delicate brownish membrane (*membrana fusca,*) (§ xiv).

§ vi. In front, the sclerotica receives the cornea. Posteriorly, and to the nasal side of the axis of the eyeball, the sclerotica is perforated by the optic nerve (17), and is there continuous with the sheath (2) which that nerve derives from the dura mater (§ xxv). Near the entrance of the optic nerve, the sclerotica is about 1-20th of an inch in thickness. Behind the insertion of the straight muscles it is scarcely 1-40th of an inch, but is a little thicker in front. On the inner surface of the sclerotica, at the place where it joins the cornea, and is connected with the ciliary ligament (9), there is a circular groove, for the reception of a venous sinus, (3) *sinus circularis iridis.*[1] This venous sinus, into which a small bristle may be passed, receives some of the veins of the iris, and from it the blood passes into the anterior ciliary veins. The texture of the sclerotica consists of an interlacement of longitudinal and transverse fibres.

The sclerotica, like most other fibrous structures, possesses few blood-vessels, and these are derived principally from the muscular branches. Nerves have not been traced into its substance.

§ vii. The *cornea* (4), at once a part of the outer tunic and a lens, is framed into the front of the sclerotica. Its edge being bevelled externally, is overlapped by the edge of the sclerotica, which is bevelled in the opposite direction. The edge of the cornea is also generally overlapped on the inside by a thin prolongation of the sclerotica in the manner represented in the section. The diameter of the cornea measures about 9-20ths of an inch, (*Fig.* i. *e, f,*) but this, the transverse diameter, is a little longer than the vertical, because, in consequence of the encroachment of the sclerotica on the upper and lower edges, the circumference of the cornea is actually oval, its small end being towards the temple. Viewed internally, the circumference of the cornea is more nearly circular. The cornea is about 1-30th of an inch in thickness. In the adult, its surfaces

re parallel; but in the child it approaches somewhat to the form of a meniscus, while in old age it has a tendency to become concavo-convex.

We distinguish in the cornea three principal layers; 1st, the *proper substance* of the cornea in the middle (4); 2dly, the *conjunctiva corneæ* in front (4′); 3dly, the *membrane of the anterior chamber of the aqueous humour* behind (6).

§ viii. The proper substance of the cornea may, by dissection, be divided into laminæ; but this separation is merely artificial, as may be proved by subjecting the cornea to maceration, when it will absorb water, become thicker, and present a spongy appearance, but no trace of laminæ. Moreover, microscopical observation shows it to consist merely of interweaving bundles of fibres. The cornea and sclerotica, being both fibrous structures, present an interlacement at their junction (§ vii), and the one is distinguishable from the other only by the difference in transparency.

§ ix. The conjunctival layer of the cornea, not admitting of being separated in a distinct form like the sclerotic conjunctiva, may be viewed as composing, with the proper substance of the cornea, a fibro-mucous membrane. What of the conjunctival layer of the cornea is separated by the action of boiling water, &c. is at the same time rendered opaque. It consists of a fine epithelium, together with a substance, which may be compared to the corpus mucosum of the tegumentary system. Both these structures exist in the sclerotic conjunctiva, though the second is not so thick as over the cornea. They are composed of microscopical corpuscles with nuclei in their centre. It is the chorion which is incompletely developed in the conjunctiva corneæ. Merely the elements of it, consisting of a stratum of blood-vessels, exist, and are in immediate connexion with the proper substance of the cornea.[2]

§ x. What is called the membrane of the anterior chamber of the aqueous humour, or membrane of Descemet, lines the whole posterior surface of the cornea. Though it is often said to be reflected upon the anterior surface of the iris (6), it cannot, in the adult, be demonstrated farther than a little way beyond its ciliary edge. When peeled from the proper substance of the cornea, the membrane under consideration curls into a roll, and if spread out and examined under the microscope, it appears a homogeneous transparent substance. Its free surface is invested with a very delicate epithelium, composed of microscopical nucleated corpuscles.

§ xi. The three structures of the cornea just described have a close vascular connexion with each other. Individually, the conjunctival layer has a direct vascular connexion with the conjunctiva, the proper substance with the sclerotica, and the membrane of Descemet with the iris. Around the margin of the cornea, the vessels of all these parts communicate.

The blood-vessels of the ocular conjunctiva are derived partly from the lacrymal, partly from the upper and lower palpebrals, and partly from the

muscular. The fine twigs of these blood-vessels form, in the part of the conjunctiva covering the sclerotica, a superficial and a deep-seated vascular network. The twigs forming the superficial vascular network run in a serpentine manner towards the margin of the cornea, and divide into still smaller branches. At the margin of the cornea, they anastomose together by arches, and are connected with the deep-seated vascular network, which is much finer than the superficial. From the vascular wreath thus formed round the cornea, numerous twigs arise, and proceed, subdividing in their course, towards the centre of the cornea, into the proper substance of which they appear at last to penetrate.

No blood-vessels are visible in the cornea to the naked eye, except in inflammation, or in the early stage of development. Sometimes in very successful injections the vessels of the conjunctiva corneæ are filled. From such preparations, the above description, borrowed from Professor Römer,[3] was drawn.

The minute vessels, seen radiating towards the margin of the cornea, and forming the pink coloured zone on the anterior surface of the sclerotica in iritis, are the *anterior ciliary*. They are derived from the ophthalmic, lacrymal, supra-orbital, and muscular. Opposite the insertion of the ciliary ligament (§ xv), they pierce the sclerotica and gain the interior of the eye, where, in the substance of the annulus albidus (§ xv), they subdivide, and then enter the iris at its ciliary edge. Branches also penetrate between the cornea and membrane of Descemet. The anterior ciliaries anastomose with the vessels of the conjunctiva, and, in penetrating the sclerotica, send twigs forward to the substance of the cornea. Within the eye, the anterior ciliaries send a few twigs back into the choroid, to anastomose with the posterior ciliaries (§ xiv).

§ xii. The existence of nerves in the cornea, as first pointed out by Professor Schlemm[4] of Berlin, who traced branches of the ciliary nerves to it, has been recently confirmed by others.[5]

§ xiii. The *choroid* (7) is essentially a vascular membrane. It lies within the sclerotica. Behind, it is perforated by the optic nerve, and in front, where the sclerotica receives the cornea, the choroid presents a large opening for the reception of the iris. Anteriorly, the choroid may be separated into two layers; but towards the back part of the eye, such a separation is impossible. The division of the choroid into two layers, was first mentioned by Ruysch,[6] whose son Henry proposed the name of *tunica Ruyschiana* for the *inner*, leaving to the *outer* the name of *choroid*. The arteries of the choroid are ramified chiefly in the inner layer or tunica Ruyschiana, and the veins in the outer layer.

§ xiv. The chief arteries of the choroid are the *short* or *posterior ciliaries*, twenty or thirty in number, which arise directly or indirectly from the ophthalmic, and enter the eye near the optic nerve. The extremities of the arteries form on the inner surface of the choroid a fine net-

work, which has been particularly described and beautifully delineated by Soemmerring.[7] The principal veins, which from the peculiarity of their course, are called *vasa vorticosa*, were for a long time considered as arteries; they gather chiefly into four trunks, which immediately pass out through the sclerotica, midway between the cornea and the optic nerve. The nerves seen on the outer surface of the choroid, pass on towards the iris (§ xx). If the substance of the choroid receives any nervous ramifications, they must be inconsiderable.

§ xv. The *annulus albidus* (8) is a body of a peculiar texture. It is enclosed between the two layers into which the choroid is divisible anteriorly; it has the form of a flat circular band about 1-8th of an inch broad, thick anteriorly and thin posteriorly. The ciliary nerves, on their way to the iris, enter the substance of the annulus albidus (§ xx); but are with difficulty traced through it, a circumstance which induced Soemmerring to consider it as a ganglion, and to bestow on it the name of *annulus gangliformis*.

Anteriorly the annulus albidus is attached to the sclerotica, where the latter joins the cornea, by a process (9) called the *ciliary ligament*. This attachment, the principal bond of union betwixt the sclerotica and choroid, is strengthened on the one hand by the reflection of the membrane of the aqueous humour from the cornea to the iris, and on the other by that of the membrana fusca from the sclerotica to the choroid.

§ xvi. The *membrana fusca*, called also *arachnoidea oculi* (5), thus invests the corresponding surfaces of the sclerotica (§ v) and choroid, being reflected, in the manner of a serous membrane, from the sclerotica to the choroid, posteriorly around the entrance of the optic nerve, anteriorly behind the ciliary ligament, and at every place where a vessel or nerve passes from either of these tunics to the other. There being a great many such vessels and nerves, especially at the back part of the eye, the cavity of the arachnoidea oculi is rendered less evident there than anteriorly. The arachnoidea oculi is more defined in the fœtus than in the adult. Henle has found epithelic corpuscles on the free surfaces of the arachnoidea oculi.[8]

§ xvii. The outer layer of the choroid goes no farther than the ciliary ligament, but the inner layer is continued into the corpus ciliare. The *corpus ciliare* (10, 10′), extends from opposite the apparent termination of the retina as far as the edge of the crystalline body, a space which measures nearly one quarter of an inch on the temporal side of the eye, but less on the nasal side. It is divided into a *pars plicata* or *fimbriata* (10), and a *pars non-plicata* or *non-fimbriata* (10′). The former, which is composed of the *ciliary processes*, is a little less than 1-10th of an inch in breadth, the latter somewhat more. The corpus ciliare corresponds to the zonula ciliaris (§ xxxv) (25) on the anterior part of the vitreous body, their folds and intervening depressions reciprocally receiving each other.

The posterior edge of the ciliary body is denticulated, as is seen in the section, and is known by the name of *ora serrata* (11). The ciliary processes are about seventy in number. They are very vascular, and are supplied from the same sources as the choroid (§ xiv). Their anterior extremities project free into the posterior chamber, and although they may touch the circumference of the crystalline body, do not adhere to it. The ciliary processes appear, like the choroid, to receive few nerves.

II.—Parts Subsidiary to the Perfection of the Eye as an Optical Instrument.

§ xviii. The *iris* (12) is a circular membrane, which divides the aqueous cavity into two compartments, called the chambers of the aqueous humour. As the cornea is set into the sclerotica, so the iris may be said to be set into the choroid in front (§ xiii). It is attached by its circumference to the anterior part of the annulus albidus. In the natural state it is quite plane, neither projecting towards the cornea, nor inclining towards the lens. Not exactly in its centre, but a little towards the nasal and upper side, it is perforated by an aperture, called the *pupil* (13), which varies in size according to the expansion and contraction of the iris. The circumference of the iris is called the *ciliary edge*, and the boundary of the pupil its *pupillary edge*. Its anterior surface, which is variously coloured in different individuals, presents numerous whitish fibres radiating towards the pupillary edge. At a short distance from the edge of the pupil, they collect into bundles or knots, and again separate. For the space of about 1-30th of an inch round the margin of the pupil, it is observed that these streaks are more closely arranged, so that here the iris has a somewhat different aspect from what it has in the rest of its extent. This portion of the iris, called the *inner* or *smaller ring*, contains circular fibres, and appears to be the seat of that motion which produces contraction of the pupil, whilst the other portion of the iris called the *outer* or *larger ring*, consisting of radiating fibres, is probably the seat of the opposite motion. On the posterior surface are observed elevated lines, proceeding from the anterior part of the attached edge of the ciliary processes towards the pupil. These lines, however, are not seen until the delicate membrane (§ xliv) and layer of black pigment (§ xxiii), which cover the posterior surface of the iris, are removed.

§ xix. Besides blood-vessels and nerves, in which the iris is very rich, another tissue enters into its composition, which, in order to explain the motions of the iris, is admitted to be muscular, though it does not exactly resemble even the unstriped organic muscular fibres of other parts, much less the characteristically striped fibres of common muscles. The iris, it may be remarked, being suspended in a watery medium, less power will be required to move it, than if it were suspended in air, in consequence

of the resistance of its own weight being thus in a great measure removed. The notion of the structure of the iris being erectile is disproved by all the phenomena attending its motions. It is certain that when there is dilatation of the pupil, the iris is as much in an active state, as it is when there is contraction of the pupil. In the former case, the larger ring of the iris is contracted in the direction of its radius, and in the latter case the smaller ring is circularly contracted. It is also certain that the state of relaxation of the iris is that in which the pupil is neither much contracted nor much dilated, a state in which the pupil always is some time after death, and to which, in consequence of an elasticity which the tissue of the iris possesses, it has a constant tendency to return after the contracting or dilating force has ceased to act.[9]

§ xx. There are two arteries peculiarly devoted to the iris, called the *iridal* or *long ciliaries;* but it also derives blood from the anterior ciliaries (§ xi). It receives very few twigs from the branches of the short or posterior ciliaries ramifying in the ciliary processes (§ xvii). The long ciliary arteries perforate the sclerotica a little farther from the optic nerve than the posterior ciliaries do. Accompanied by their corresponding veins and nerves, they run on the external surface of the choroid, towards the iris, in the direction of the equator of the eyeball, sometimes, however, a little higher, sometimes a little lower, the one on the nasal, and the other on the temporal side. At about a quarter of an inch from the iris, they divide at an acute angle, each into two branches, an upper and a lower. The two upper branches inosculate above, and the two lower below, in the substance of the annulus albidus. There they send off branches, which, together with the anterior ciliary arteries, form a ring at the ciliary edge of the iris. From this, branches radiate in the substance of the iris to its pupillary edge, near which another vascular circle is formed. From the sinus circularis iridis (§ vi), and principally in the annulus albidus, the anterior ciliary and the long ciliary veins arise. The former make their way through the sclerotica immediately; the latter accompany their corresponding arteries. The iris is supplied by the *ciliary nerves,* which are derived from the ophthalmic ganglion, and nasal branch of the first division of the fifth nerve. They perforate the sclerotica at the back part of the eye, lie flat on the outer surface of the choroid (§ xiv), and, in the substance of the annulus albidus (§ xv), divide into branches, which pass into the iris.

§ xxi. By the dilatation and contraction of the pupil, the quantity of light admitted into the eye is regulated, and hence the iris may be considered in some sense as a photometer. It is also to the eye what a diaphragm is to a telescope, serving to correct the aberration of sphericity.

§ xxii. *Pigmentum nigrum and its membrane.* The internal surface of the choroid and corpus ciliare, and the posterior surface of the iris, are covered with a layer of dark-brown matter, commonly called *pigmentum*

nigrum, and formerly described as a mucus or varnish, as inorganic as the black paint with which opticians obscure the interior of their instruments. The fact is, however, that the pigment is contained in a membrane possessing a peculiar organization. This, the *membrane of the pigment* (14), with the exception of being a little lighter in tint around the entrance of the optic nerve, is of a uniform brown colour, as far as the ora serrata of the ciliary body; here it becomes of a darker hue, and remains so where it covers the pars non-plicata of the ciliary body. It envelops the ciliary processes, dipping into the depressions between them, where it contains more colouring matter than upon the prominent parts of the processes themselves.

§ xxiii. On the posterior surface of the iris, the black pigment is called *uvea*, a name applied, however, sometimes to the choroid, and frequently to the whole of the iris. The uvea presents the pigment in large quantity, and not contained, as on the inner surface of the choroid, in a well defined structure, but rather loosely deposited in a cellular tissue; it is, however, prevented from mingling with the aqueous humour by a very delicate membrane, the *membrane of the posterior chamber of the aqueous humour* (15) (§ xliv).

§ xxiv. The intimate structure of the membrane of the pigment is very peculiar. If a fragment of that part of it which lines the choroid be examined with a microscope, it is seen to consist of very minute flat bodies of a hexagonal form, (*Fig.* ii.) joined together at their edges. These bodies, which are about 1-1000th part of an inch in diameter, consist of a transparent nucleus, surrounded by an envelope containing the colouring matter, which is most accumulated at their circumference. The centre indeed of each hexagonal plate is a transparent point. That part of the membrane of the pigment situated on the pars non-plicata of the ciliary body, around the ciliary processes, and on the posterior surface of the iris, is composed of irregularly-rounded bodies analogous to the hexagonal plates. In albinoes, the same membrane exists, but contains no pigment. The central nuclei of its component corpuscles then appear very prominently. In those animals in which there is what is called the *tapetum lucidum* on the inner surface of the choroid, the membrane immediately over the most brilliant part, is, as in albinoes, destitute of pigment.[10]

Fig. ii.

III. Specially Sensitive Parts.

§ xxv. The *optic nerve* (17) enters the posterior part of the eyeball about 1-5th of an inch to the nasal side of its axis. It is surrounded by a strong fibrous sheath (2), which on the one hand is continuous with the dura mater, and on the other with the sclerotica (§ vi). The fibres (17′) of the optic nerve, visible to the naked eye, are composed of fasciculi of

primitive tubules or fibres enclosed in a neurilema, or cellular sheath, and the whole enveloped in a general neurilema. The neurilemata of the fibres cease as the nerve penetrates the sclerotica, whence arises the contraction of the nerve observed in that situation, and the appearance commonly described under the name of *cribriform lamina* of the sclerotica. Within the eye, the nerve forms a slight projection (19), the *papilla conica*. About the third of an inch from the sclerotica, the optic nerve is perforated obliquely from below by the *central artery* of the retina (18), which runs through a narrow cylindrical canal in the centre of the nerve, into the eye, where it divides into three branches, two of which are distributed to the retina, while the third passes forward through the vitreous body, giving branches to the hyaloid membrane, and terminating in radii on the posterior wall of the capsule of the lens.

§ xxvi. The *retina* (20) is a transparent expansion of nervous substance, situated within the choroid (§ xiii), continuous behind with the optic nerve, and according to some, terminating anteriorly at the ora serrata of the corpus ciliare, but according to others, extending as far as the circumference of the crystalline body. Towards the inner surface of the retina, its blood-vessels form a fine network, which has been called the cellulo-vascular layer. This, when the nervous substance is removed by maceration, has some resemblance to a leaf deprived of its parenchyma. In the section, the retina is represented as if terminating anteriorly by a serrated margin, but if carefully dissected, and the appearances minutely examined, the retina, although much reduced in thickness, really appears to be continued farther forward, adhering to or forming the zonula ciliaris.

§ xxvii. In the direction of the axis of the eye, the retina is raised into a small fold, which extends from near the temporal side of the entrance of the optic nerve transversely outwards for about 1-5th or 1-6th of an inch. Here the retina presents a spot, about 1-5th of an inch in diameter, of a fine yellow colour, deeper in tint at the centre than at the circumference, and about the middle of the spot, is a transparent point (21). These parts were discovered, in 1791, by S. T. Soemmerring,[11] who, considering the transparent point a hole, called it *foramen retinæ centrale*, and the yellow spot, *limbus luteus foraminis centralis*. The appearances just described are found only in the human eye, and in that of quadrumanous animals. In the chameleon and some other lizards, there is a central point or hole, which appears continuous with the small fissure through which the rudimental pecten of those animals projects, a circumstance which goes to support the opinion that there is an analogy between the central point of the retina and the fissure in the retina of birds for the passage of the pecten. This opinion, first suggested by Professor Huschke of Jena,[12] has its principal foundation in the appearances presented by the eye in the different stages of its development, but into which it would be foreign to our purpose to enter. There have been many

conjectures regarding the nature of the yellow spot. Dr Ammon, of Dresden,[13] is of opinion, and in this he is joined by Dr Arnold,[14] that the yellow spot is owing to the black pigment changed in colour. That the pigment is there sometimes of a yellowish colour is true, but its tint is very different from that of the yellow spot; moreover, the pigment is separated from the yellow spot by the interposition of the membrane of Jacob.

§ xxviii. The primitive fibres or tubules of the optic nerve are entirely microscopical. They are similar to those constituting the substance of the brain, with which they are on the one hand continuous, and on the other with similar fibres in the retina.

§ xxix. In addition to its blood-vessels, already alluded to, and the delicate cellular tissue supporting them, the retina presents three different elements in its structure, forming as many layers. The outermost is a mucus-like substance, consisting of granules or globules arranged in the manner of pavement. The next or middle layer is formed of the radiating expansion of the primitive fibres or tubules, continued from those of the optic nerve. The third or innermost layer, which is found over the whole inner surface, the entrance of the optic nerve not excepted, consists of upright cylindrical papillary bodies, which project through the vascular layer, and into which the fibres of the middle layer, suddenly bending inwards, are supposed to pass. The cylindrical papillary bodies are difficult of demonstration, as they are very brittle, readily separate from the retina, and become changed. The fibrous layer of the retina is most easily shown in the rabbit.[15]

§ xxx. The retina receives vessels principally from the arteria centralis retinæ (§ xxv). Very minute twigs from the vessels of the choroid are said to pass into the retina. Does the retina receive any nerves? Tiedemann observed twigs of the ciliary nerves accompany the central artery to the retina. Ribes affirms also that he has traced branches from the ciliary nerves, where they lie between the sclerotica and choroid, backwards through the latter membrane into the retina.

§ xxxi. *Membrane of Jacob* (16). This is a layer of extreme tenuity, situated betwixt the retina and the membrane of the pigment.[16] It can be seen only when the eye is carefully dissected under water. It is not easy to say how it terminates anteriorly. It cannot be distinctly traced farther than the ora serrata. Examined with the microscope it has the appearance represented in *figure iii.*

Fig. iii.

IV. Dioptric Parts, Refractive Media, or Lenses.

§ xxxii. The *vitreous body* (22), situated immediately within the retina, occupies the middle and posterior part of the eye, and forms 4-5ths of its

whole contents. Its shape is that of a reverse meniscus, the concavity, or *fossa hyaloidea*, which it presents in front, serving for the reception of the crystalline lens. The vitreous body is composed of a very delicate and transparent membrane called the *hyaloid* (23), processes of which extend inwards, and form a great many cells, all communicating with each other, and in which is contained a fluid of a viscid consistence, called the *vitreous humour*.

§ xxxiii. Just at the entrance of the optic nerve, the hyaloid membrane is reflected forwards, so as to produce a canal which extends through the centre of the vitreous body to the posterior wall of the capsule of the lens. This canal, called *canalis hyaloideus* (24), is for the passage of the capsular branch of the central artery of the retina.

§ xxxiv. Anteriorly, and about a line from the edge of the crystalline body, the hyaloid divides into two layers, one of which goes behind the posterior wall of the capsule of the lens, adheres to it, and closes in the vitreous cells in front, whilst the other layer passes to the circumference of the capsule of the lens. By the divergence of these two layers, a space is left all round the edge of the crystalline body. This space, which is called the *canal of Petit* (26), when distended with air, presents a beaded appearance.

§ xxxv. The *Zonula ciliaris* or *zonula Zinnii* (25) is a ring, about one-fifth of an inch broad, situated on the anterior part of the vitreous body, and formed of small striæ and folds, encircling the lens like radii. It is the counter-part of the ciliary processes (§ xvii), with which it is dove-tailed, the folds of the one being received into the interstices of the other. On separating them, some fragments of the membrane of the pigment of the ciliary body generally remain adherent to the ciliary zone, and hence the latter has been considered merely as an impression of the former, and called *halo signatus*. It is a question whether the ciliary zone be merely the hyaloid thickened and raised into folds, a continuation of the retina, or a distinct texture.[17] The most probable opinion appears to be, that it is the hyaloid thickened and raised into folds, together with a very thin prolongation of the retina. The ciliary zone is very vascular, from the confluence as it were of the blood-vessels of the ciliary processes, of the retina, and of the posterior wall of the capsule of the lens.

§ xxxvi. The united folds of the ciliary zone and ciliary processes, overlap the edge of the lens in front, but do not adhere to it, there being betwixt the circumference of the lens and the anterior edge of the ciliary zone, a ring of transparent hyaloid, called *zonula lucida*,[18] broader on the temporal than on the nasal side.

§ xxxvii. The *crystalline body* (27, 28, 29,) forms a double-convex lens, about 7-20ths of an inch in diameter, and half as much in thickness at its axis. It is not placed exactly in the axis of the eyeball, but a little to-

wards the nasal side of the eye. Its anterior surface is flatter than its posterior, the radius of the convexity of the former (*Fig.* iv. *a*) being much the same as that of the cornea, the radius of the convexity of the latter (*Fig.* iv. *b*) 9-40ths of an inch. Its circumferential edge is thick and rounded, as is represented in the section. The crystalline body comprehends the lens (27) and capsule (28, 29).

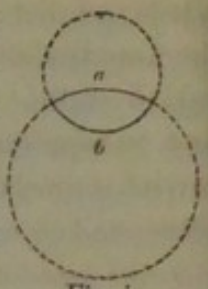

Fig. iv.

§ xxxviii. The lens consists of concentric laminæ, composed of fibres, visible under the microscope, not only after the lens has been subjected to the coagulating action of alcohol, acids, heat, &c. but also in the recent state. The laminæ are denser and more spherical the nearer they are to the centre. The fibres turn round the thick circumference of the lens from one surface to the other. To enter into their peculiar arrangement, and their denticulated mode of junction, would occupy more space than is consistent with the object of this sketch.[19]

§ xxxix. The capsule presents an anterior wall or hemisphere (28), and a posterior (29), the former of which is thicker than the latter. The texture of the capsule resembles that of the membrane of the aqueous humour on the posterior surface of the cornea. Dr Werneck[20] of Salzburg has detected on the inner surface of the capsule a second distinct layer, composed of nucleated polygonal or hexagonal corpuscles, similar to those of epithelium, and of the membrane of the pigment when without colouring matter. Betwixt the lens and capsule there is said to be a fluid, called *liquor Morgagni;* but its existence in the recent and natural state may be justly doubted.

§ xl. The crystalline body thus composed, is seated in the fossa which the vitreous body presents in front (§ xxxii), the posterior wall of the capsule adhering closely to that layer of the hyaloid which lines the fossa in question.

§ xli. In the fœtus, the capsule of the lens is very vascular. The posterior wall, which is more vascular than the anterior, receives its vessels from the capsular branch of the central artery of the retina. The anterior wall is supplied by branches from the arteries of the ciliary body, which, together with twigs from the capsular branch of the central artery of the retina, form a vascular circle around the circumference of the capsule. From this circle, branches radiate to the centre of the anterior wall of the capsule, and anastomose by arches with each other. In the adult, except in disease, vessels carrying red blood are not apparent in the crystalline body.

§ xlii. *Orbiculus capsulo-ciliaris.* The structure to which this name was given by Dr Ammon,[21] consists of a corona of filaments, extending from the inner or posterior surface of the ciliary processes to the capsule of the lens. These filaments are fine like spider's web, and arising sometimes stronger, sometimes weaker, from the posterior ex-

remity of the ciliary processes, frequently extend only to the edge of the capsule, often, however, over its surface anteriorly, for the space of 1-10th of an inch or more. The filaments are very elastic. If, therefore, in adapting the eye to the examination of near objects, the lens be carried forward, they will by their elasticity draw it back into its usual situation, when the exertion is discontinued.

§ xliii. The *aqueous humour* (30, 31), is bounded in front by the cornea, behind by the anterior wall of the crystalline capsule, and at its circumference by the ciliary processes and anterior edge of the annulus albidus. Its axis measures rather more than 1-10th of an inch. The cavity containing the aqueous humour is divided by the iris, into an anterior (31) and posterior chamber (30), the axis of the former measuring somewhat less than 1-10th of an inch, and that of the latter about 1-50th of an inch. The aqueous humour, taken as a whole, has the form of a meniscus. The shape of the aqueous humour contained in the anterior chamber is that of a plano-convex lens, while that of the aqueous humour in the posterior chamber is plano-concave; but if the iris should project forwards, which it does in some diseased states of the eye, then the anterior chamber has the shape of a meniscus, and the posterior that of a concavo-convex lens.

§ xliv. The *membrane of the aqueous humour*, or membrane of Descemet, as has been mentioned (§ x), cannot in the adult be traced on the anterior surface of the iris farther than a little way beyond its ciliary margin. A continuous membrane lining the anterior chamber of the aqueous humour, cannot be demonstrated. A membrane lining the posterior chamber of the aqueous humour is more demonstrable.[22] It invests the pigment on the posterior surface of the iris (§ xxiii), envelops the free extremities of the ciliary processes, and hence is reflected to the circumference of the crystalline capsule (15).

§ xlv. The free surface of the membrane of Descemet is invested, as has been above mentioned (§ x), by a delicate epithelium. Henle[23] has found an epithelium neither on the surfaces of the iris nor on the anterior wall of the capsule of the lens, a new proof, says he, against those who think the whole anterior and posterior chambers are lined by a serous sac. Valentin,[24] however, describes an epithelium, both on the anterior and posterior surfaces of the iris; and I can add that I have found epithelic corpuscles on the anterior surface of the anterior wall of the capsule of the lens in a lamb's eye.

§ xlvi. Without entering into the history of the development of the eye, it is proper to mention that in the fœtus, the pupil is closed by a delicate vascular membrane, called the *pupillary membrane*. Most perfect at the sixth month, it tends to disappear shortly before birth, though it occasionally persists some time after. The pupillary membrane consists of a single layer, and as was first shown by Rudolphi[25] does not proceed

from the edge of the pupil, but from the anterior surface of the iris, where the larger joins the smaller ring. The edge of the pupil thus exists quite free, only the inner ring is not yet completely developed.

§ xlvii. The pupillary is not to be confounded with another membrane, called the *capsulo-pupillary*,[26] which, attached to the anterior surface of the iris, along with the pupillary membrane, but without being farther connected with the latter, extends backwards through the pupil, free of adhesion to any part till it arrives at the anterior surface, towards the circumference of the capsule of the lens, to which it applies itself, and thence turns round to the posterior wall of the capsule. The blood-vessels of the posterior wall of the capsule of the lens, which are derived from the capsular branch of the central artery of the retina (§ xli), pass into the capsulo-pupillary membrane, and run nearly in parallel lines, with few anastomoses, to the insertion of the membrane on the anterior surface of the iris, where they are connected with the vessels of the iris and of the pupillary membrane. Professor Retzius, of Stockholm, is of opinion that the capsulo-pupillary membrane is to the development of the crystalline body what the vascular sac is to the development of a tooth.[27]

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[1] Schlemm, Ueber einen kreisförmigen dünnhäutigen Kanal in der Verbindungstelle von Sclerotica und Cornea im menschlichen Auge; Rust's theoretisch-practisches Handbuch der Chirurgie, Vol. iii. p. 333; Berlin, 1830; *quoted in* Ammon's Zeitschrift für die Ophthalmologie, Vol. i. p. 543; Dresden, 1831. Arnold, Anatomische und physiologische Untersuchungen über das Auge des Menschen, p. 10; Heidelberg, 1832.

[2] Valentin, Die feinere Anatomie des Auges; Repertorium für Anatomie und Physiologie; Vol. i. p. 146; Berlin, 1836-7.

[3] Bemerkungen über die arteriellen Gefässe der Bindehaut des Augapfels; Ammon's Zeitschrift, Vol. v. p. 34; Heidelberg und Leipzig; 1835.

[4] Encyclopädisches Wörterbuch der medicinischen Wissenschaften, Vol. iv. p. 22; Berlin, 1830; *quoted in* Ammon's Zeitschrift, Vol. i. p. 113.

[5] Bochdalek; Bericht über die Versammlung der Naturforscher zu Prag im Jahre 1837; p. 182, Prag. 1838. Pappenheim, Ueber die Nerven der Cornea; Monatsschrift für Medicin, Augenheilkunde und Chirurgie, von Dr F. A. v. Ammon, Vol. ii. Heft iii. p. 281; Dresden, 1839.

[6] Ruysch, Responsio &c. de Oculorum Tunicis; Epistola anatomica, problematica tertia et decima, p. 16; Amstelædami, 1700.

[7] Ueber das feinste Gefässnetz der Aderhaut im Augapfel; Denkschriften der königlichen Akademie der Wissenschaften, Vol. vii; München, 1821.

[8] Henle, Ueber die Ausbreitung des Epithelium im menschlichen Körper; Müller's Archiv, 1838; p. 116.

[9] Weber, Tractatus de Motu Iridis; Lipsiæ, 1821 et 1823. Edinburgh Medical and Surgical Journal, Vol. xli. p. 40; Edinburgh, 1834.

[10] Hunter, Observations on certain parts of the Animal Œconomy, p. 199; London, 1786. Carlo Mondini; De Bononiensi Scientiarum et Artium Instituto atque Academia Commentarii, Tom. vii. p. 29; Bononiæ, 1791. Kieser, de Anamorphosi Oculi, pp. 33, 34; Gottingæ, 1804. Francesco Mondini, Osservazioni sul Nero

Pigmento dell'Occhio; Opuscoli Scientifichi dell'Università di Bologna, Fasc. vii. p. 15; Bologna, 1818. Edinburgh Medical and Surgical Journal, Vol. xl. p. 77; Edinburgh, 1833.

In the chick at an early period, the choroid adheres closely to the sclerotic, whilst the membrane of the pigment is very distinct. In consequence of this, Professor Baer and others, who have written on the development of the eye, appear to have wholly overlooked the choroid, and mistaken the membrane of the pigment for it.

[11] S. Th. Soemmerring de Foramine Centrali Limbo Luteo cincto Retinæ Humanæ; Commentationes Societatis Regiæ Scientiarum Gottingensis, Vol. xiii. p. 3; Gottingæ, 1799.

[12] Huschke, Commentatio de Pectinis in Oculo Avium Potestate anatomica et physiologica, § 8; Jenæ, 1827. Huschke, Untersuchungen über einige Streitpunkte in der Anatomie des menschlichen Auges; Ammon's Zeitschrift für die Ophthalmologie, Vol. iii. p. 19; Dresden, 1833. Stark, Physiologische und anatomische Deutungen über den gelben Fleck, das Centralloch und die Falte in der Netzhaut des menschlichen Auges; Ammon's Zeitschrift für die Ophthalmologie, Vol. i. p. 495; Dresden, 1831.

[13] De Genesi et Usu Maculæ Luteæ in Retina Oculi Humani obviæ; Vinariæ, 1830.

[14] Op. Cit.

[15] See an Article on the Structure of the Brain and Nerves, in the British and Foreign Medical Review for October 1838, in which the observations of Ehrenberg, Treviranus, Valentin, &c. are discussed. See also Langenbeck, De Retina Observationes Anatomico-pathologicæ; Gottingæ, 1836. Gottsche, Ueber die Retina; Pfaff's Mittheilungen aus dem Gebiete der Medicin; Altona, 1836; Hefte, 3—6. London and Edinburgh Philosophical Magazine for January 1836. Remak, Zur mikroscopischen Anatomie der Retina; and Henle, Anmerkung zu deisem Aufsatz; Müller's Archiv, Heft ii, p. 164-170; 1839.

[16] Philosophical Transactions for 1819, p. 300.

[17] Schneider, Das Ende der Nervenhaut im menschlichen Auge; München, 1827.

[18] Jacob, Medico-Chirurgical Transactions, Vol. xii. London, 1823; and Cyclopædia of Anatomy and Physiology, Part xi. p. 193. Watson, Compendium of the Diseases of the Human Eye, p. 62; Edinburgh, 1830.

[19] Sir David Brewster; Philosophical Transactions for 1833, and 1836. Werneck, Beiträge zur Geweblehre des Krystallkörpers; Nachschrift hiezu vom Professor Dr Rudolph Wagner in Erlangen; Ammon's Zeitschrift, Vol. v. pp. 403, 429; Heidelberg und Leipzig; 1837.

[20] Werneck, Mikroskopisch-anatomische Betrachtungen über die Wasserhaut and das Linsensystem des Auges; Ammon's Zeitschrift für die Ophthalmologie, Vol. iv. p. 28.

[21] Ammon, Der Orbiculus capsulo-ciliaris, eine Verbindung, welche im menschlichen Auge zwischen der hintern Fläche der Ciliarfortsätze und der vordern Linsenkapselwand besteht; Zeitschrift für die Ophthalmologie, Vol. i. p. 1; Dresden, 1830.

[22] Jacob; Medico-Chirurgical Transactions, Vol. xii. London, 1823; and Cyclopædia of Anatomy and Physiology, Part x. p. 183; Part xi. p. 203.

[23] Loc. Cit.

[24] Die feinere Anatomie des Auges; Repertorium, &c. Vol. ii. p. 248. Bern und St Gallen; 1837.

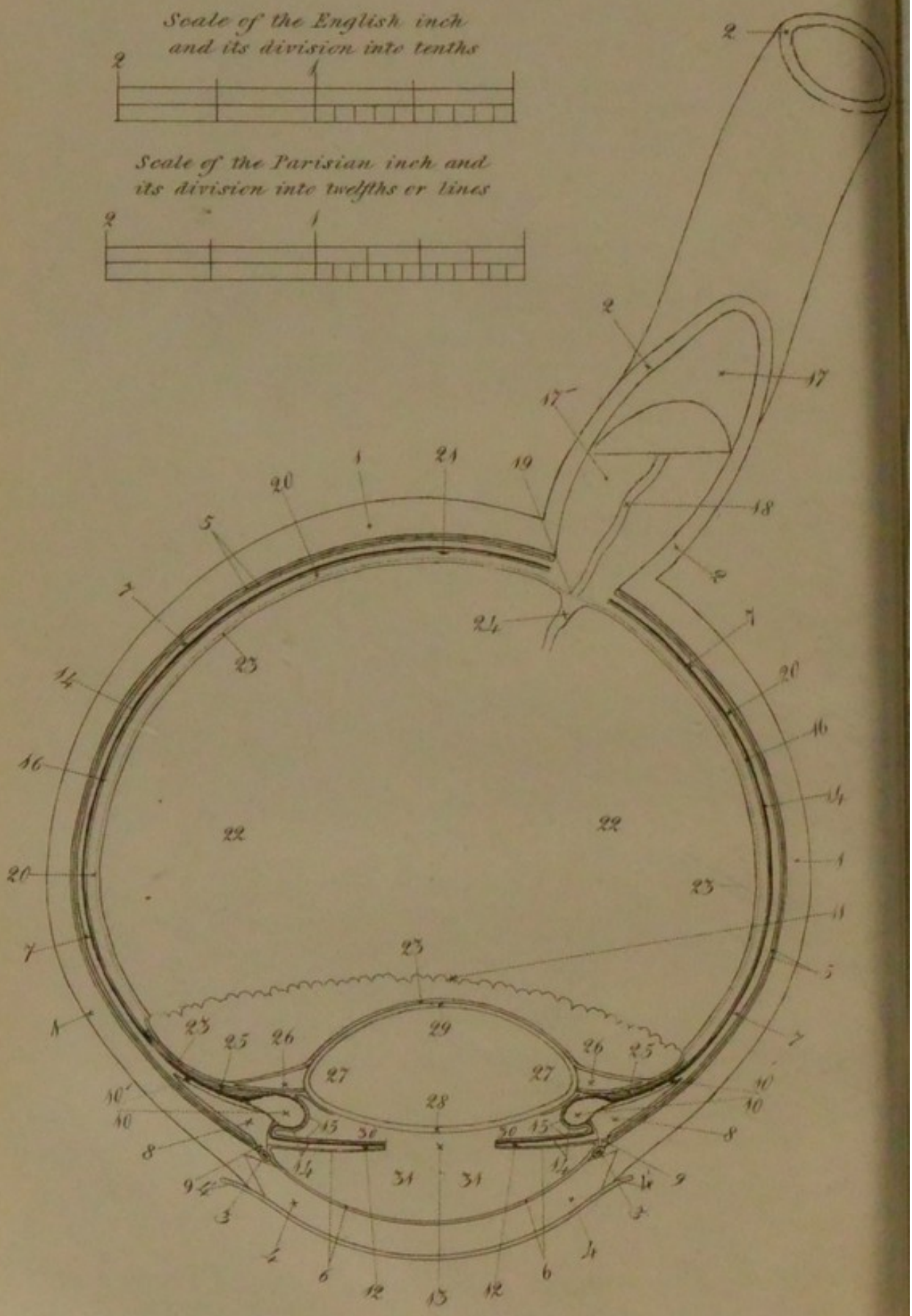
[25] Grundriss der Physiologie, § 310; Berlin, 1823.

[26] W. Hunter's Medical Commentaries, Part i. p. 63; London, 1777. Henle, De Membrana Pupillari aliisque Oculi Membranis pellucentibus; Bonnæ, 1832.

[27] *Quoted in* Ammon's Zeitschrift, Vol. v. p. 369, from Tidskrift för Läkare och Pharmaceuter, Andra Bandet, Maj; Stockholm, 1833.

1. Sclerotica.
2. Sheath of the optic nerve, a continuation of the dura mater.
3. Circular venous sinus of the iris.
4. Proper substance of the cornea.
4′. Conjunctiva extending over the cornea.
5. Arachnoidea oculi.
6. Membrane of the anterior chamber of the aqueous humour. Of the two dotted lines, one points to the membrane of Descemet, the other to the supposed continuation of that membrane over the anterior surface of the iris.
7. Choroid.
8. Annulus albidus.
9. Ciliary ligament.
10, 10′. Ciliary body, consisting of (10′) a pars non-fimbriata, and (10) a pars fimbriata formed by the ciliary processes.
11. Ora serrata of the ciliary body.
12. Iris.
13. Pupil.
14. Membrane of the pigment.
15. Delicate membrane lining the posterior chamber of the aqueous humour.
16. Membrane of Jacob.
17. The optic nerve surrounded by its general neurilema.
17′. The fibres of the optic nerve, consisting of fasciculi of primitive tubules.
18. Central artery of the retina.
19. Papilla conica of the optic nerve.
20. Retina. The situation of its vascular layer is indicated by a dotted line.
21. Central transparent point of the retina.
22. Vitreous body.
23. Hyaloid membrane.
24. Canalis hyaloideus.
25. Zonula ciliaris. In the plate, none of its fimbriated part is seen, being concealed by the ciliary processes.
26. Canal of Petit.
27. Crystalline lens.
28. Anterior wall of the capsule of the lens.
29. Posterior wall of the capsule of the lens.
30. Posterior chamber of the aqueous humour.
31. Anterior chamber of the aqueous humour.

* In regard to the scales of the English and French inch and subdivisions, it is to be remarked that they are not to be considered as any thing but approximations, because the contraction of the paper on drying, after being printed, produces some difference.


Scale of the English inch and its division into tenths
2
1
Scale of the Parisian inch and its division into twelfths or lines
2
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A

PRACTICAL TREATISE

ON THE

DISEASES OF THE EYE.

CHAPTER I.

DISEASES OF THE ORBIT.

SECTION I.—INJURIES OF THE ORBIT.

While considering injuries of the orbit, it is impossible entirely to avoid noticing the effects produced on the contents of this cavity; or, while treating of wounds penetrating the walls of the orbit, to pass over in silence the injuries which, in this way, the brain and other surrounding organs may sustain. Cases occur, indeed, in which it is doubtful, to the injury of what particular part, without, within, or beyond the orbit, the effects which arise ought to be attributed. Amaurosis, for example, one of the chief consequences to be apprehended from wounds of the orbit, appears sometimes to be owing to injury of the branches of the fifth pair of nerves exterior to that cavity; in other cases, to injury of the optic or other nerves within the orbit, or of the eye itself; and, in other cases, to injury of the brain.

§ 1. *Contusions of the Edge of the Orbit.*

Blows, falls, and similar accidents, are apt, especially in scrofulous children, as I shall explain more fully in the next section, to excite inflammation, running on into suppuration, and affecting the periosteum, and even the substance of the bones forming the edge of the orbit.

From blows on the edge of the orbit, particularly its upper edge, we must be prepared, however, to meet with much more serious consequences, than merely an affection of the bone or its periosteum. Effusion of blood within the cranium, concussion of the brain, or inflammation of its substance, or of its membranes, may be excited

by such an injury; and while we are perhaps confining our fears to the state of the bone, or of the soft parts which invest it, changes may be going on within, which shall suddenly prove fatal.

Case 1.—Henry II. king of France, in a tilting match with Montgomery, the ablest champion of the lance in Christendom, and who, on this occasion was compelled unwillingly to fight, was struck above the right eyebrow. The skin was torn across the forehead to the external angle of the left eye, in the substance of which there stuck several small bits of the shivered lance. There was no fracture. The injury proved mortal on the 11th day. On opening the head, Paré found a quantity of blood effused between the dura and the pia mater, under the middle of the occipital bone; and the substance of the brain at that place changed in colour and consistence.[1]

Case 2.—Mr Dease[2] was called to a woman who had been struck with a pewter quart, over the left eye, and had thus received a wound about an inch and a half long, and laying bare the bone. He bled her, and bade her keep quiet; she had a cooling laxative, kept her bed, and was allowed nothing but gruel and the like. Every thing went on well till the 14th day, when she had a slight shivering, and became hot and restless. On the 15th, her face was flushed, and her pulse quick and small. Round the wound there was a puffy swelling, and it was filled up with a soft fungus, spread over with a cream-like matter. Mr Dease pronounced matter to be under the cranium, and proposed the trepan; but another surgeon, who was called in, thought it advisable to defer it till next day. Next day she was better, and said she did not shiver. The other surgeon thought she did well in desisting from the trepan, but Mr Dease was of a contrary opinion; for her pulse though slower was still quick. For two days she remained much in the same situation; but on the third, her left eyelid swelled, and she said that for two hours in the night she had great pain and stiffness in the jaw. Next day, her neck was quite stiff. Her friends seemed unwilling to allow any operation, and Mr Dease, knowing how little it would avail her, did not press them. Next day she was speechless, and died on the 26th day from the receipt of the injury. On dissection, the dura mater under the wound was found detached, and slightly spotted with matter, the anterior part of the left hemisphere of the brain in a state of suppuration, and some fluid matter lying on the anterior and left fossa cerebri.

Case 3.—A man was struck with a pot, which caused a wound eighteen lines long, above the right eyebrow. He was somewhat stunned at the moment, but did not fall or become insensible. On the third or fourth day, fever and sleeplessness came on; the edges of the wound became tender and swoln; the patient vomited bile; he fell into a state of delirium; his abdomen was painful, especially the right hypochondrium. The symptoms grew speedily worse, locked-jaw supervened, and the man died on the 7th day. A large quantity of pus was found beneath the pericranium, in contact with the falx, and on the tentorium; the surface of the brain was highly injected, and of a darker colour than natural; the liver large, and its peritoneal covering thickened; the intestines contracted, and presenting here and there spots of purulent exudation.[3]

Consequences not less serious have been known to result from injuries of a similar sort, received at the lower edge of the orbit. Thus Petit relates a case of palsy of the left side, and death, from suppuration in the right hemisphere of the brain, consequent to a wound at the lower edge of the right orbit, close to the exit of the infra-orbitary nerve, which, however, did not appear to have been injured.[4]

Contusion of its temporal edge has been sometimes followed by the growth of encysted and other tumours within the orbit. These effects, however, as well as inflammation of the various parts contained within that cavity, and the formation of exostoses, excited by the same cause, will require separate consideration hereafter.

§ 2. *Fractures of the Edge of the Orbit.*

The only recent instance of this injury, I recollect to have seen, was from a blow with the end of a long piece of wood, which struck the lower edge of the orbit, and separated a fragment, which I concluded to be the anterior angle of the malar bone. The fractured piece moved at first easily under the finger, in different directions, but became united in the course of a few weeks. No bandage was applied; but cases may occur, in which, the eyelids being previously closed, compresses might be judiciously employed, with a roller round the head, to keep the fractured portion of the edge of the orbit in contact with the bone from which it had been separated, till the process of reunion should be completed.

Case 4.—A butcher was leaping from a barrel to the ground, and not observing a flesh-hook, which hung close by him, it caught him by the middle of the left orbitary arch, and fairly took the piece of bone with it, tearing of course the integuments and the eyebrow. The wound healed in such a way as to leave the bone peaked up in the middle, so that the patient could not completely close the eye, which consequently was exposed to frequent attacks of inflammation. During one of these, he consulted me, several years after the accident. The deficiency of the bone was very perceptible, and added to the deformity produced by the staphyloma. The ophthalmia was puro-mucous, and soon subsided under the use of a solution of nitrate of silver.

Case 5.—Biermayer[5] records the case of a boy of ten years of age, who being struck with a stone at the inner angle of the eye, was, on the 5th day after the injury, seized with tetanus, and died in a few hours. On dissection, a small portion of the nasal process of the superior maxillary bone was found lying loose in the abscess at the seat of the injury, and in contact with one of the branches of the infra-orbitary nerve.

Fractures of the edge of the orbit are apt to penetrate into the frontal or maxillary sinus, or into the ethmoid cells, and the consequence sometimes is, that on blowing the nose, air, passing through the fracture, is introduced into the cellular membrane of the eyelids, which suddenly become much swoln. In such a case, the integuments may be opened with the lancet, to let the air escape.

3. *Fractures of the Walls of the Orbit, attending Fractured Skull.*

Fractures of the skull not unfrequently extend to one or both of the orbits; and it is worthy of particular observation, that if the roof of the orbit be broken in this way, it is apt to be attended by ulceration of the dura mater, and injury of the anterior lobes of the cerebrum, which rest upon the orbits. Now, suppose that this is the case, while at the same time a fracture with depression is present, we shall say on the temple, and that this fractured piece of skull is raised into its place in the operation of trepan, the patient will, in all probability, not be relieved; the symptoms of pressure on the brain, or of inflammation within the skull, will most likely remain as before, and death follow, contrary, perhaps, to what might have been expected, if the fractured temple had been the whole injury. It will probably be only on dissection that, in such a case, the cause of death will be discovered.

Case 6.—Sir George Ballingall[6] has recorded a case of compound fracture of

the os frontis, in which, after the depressed pieces of bone were removed, the patient instantly recovered his senses, and answered questions rationally. He soon lapsed, however, into a comatose state, and died within 48 hours of the receipt of the injury. On dissection, the fracture was found to extend backwards, through both orbitary plates of the frontal bone, and to pass across the ethmoid behind the crista galli. Opposite to the fissures in the roof of each orbit, the dura mater was found lacerated to a considerable extent, and portions of brain protruding. The anterior lobes of the brain were disorganized and broken down; and, what was remarkable, there was a distinct appearance of purulent matter upon the tunica arachnoidea covering each hemisphere of the brain, although the patient had survived the accident for so short a time, lost a considerable quantity of blood from the wound, and manifested no inflammatory symptoms.

In cases of fractured skull extending to the orbit, it sometimes happens, that portions of the walls of this cavity are so completely separated, that they easily come away, either in dressing the wound, or in raising and removing the depressed pieces of the skull. The mere circumstance of a portion of bone being loose, is not sufficient ground for removing it; for if its surfaces are still attached to the membranes with which they are naturally in connexion, it may be susceptible of reunion; but if the bone be extremely shattered, and pressed partly through the dura mater, we are warranted in extracting the loose pieces.

Case 7.—Cheselden[7] communicates a remarkable case of this kind, which occurred in the practice of Mr Cagua of Plymouth, in which five splinters of the cranium, which were depressed into the substance of the brain, were extracted, the largest piece comprehending part of the orbitary plate of the frontal, of the great wing of the sphenoid, and of the suture which connects the external angular process of the frontal to the superior angle of the malar bone. Pieces of the substance of the brain followed the removal of this splinter; yet the patient, a boy of ten years of age, perfectly recovered.

Case 8.—A similar case, also terminating favourably, is recorded[8] by Dr Klein, in which several large portions of the frontal bone were removed; the roof of one of the orbits was completely loose; a wide hiatus, separating the ethmoid from the neighbouring bones, ran down towards the basis of the skull; and considerable portions of brain were discharged.

§ 4. *Fractures of the Walls of the Orbit, attending Fractured Bones of the Face.*

Of this sort of accident, it may be sufficient to give the following illustration:—

Case 9.—John Lewis, aged 11, had his face crushed by the wheel of a carriage, and the bones of the nose and cheek fractured. He lay with little appearance of sensibility, but yet understood and replied to questions when roused and forcibly addressed. He had no paralysis; but it was thought that some convulsive twitches occasionally took place on the left side. There was a good deal of ecchymosis about both eyes, and some laceration under the left, and about the nose. He died on the 6th day after the injury.

On removing the scalp, several patches of ecchymosis were seen between it and the calvaria; the largest of these was situated at the posterior part of the head. At these spots, the scalp scarcely adhered to the calvaria, but elsewhere it did so with considerable firmness. The smooth internal surface of the dura mater was of a light red; between it and the arachnoid, on the left side, there was a pretty generally diffused thin layer of puriform lymph of a light yellow colour with a tinge of green, which adhered partly to the dura mater, and partly to the arachnoid. It dipped down between the hemispheres, but was wholly confined to the left side of the falx. At the under part of the left anterior lobe, a portion of brain of about the size of a shilling, was softened to the depth of about

half an inch; and a few minute ecchymosed spots, such as are usually met with in lacerated brain, were visible at this part. There was very little laceration of the dura mater, but a portion of the left orbitary plate of the os frontis appeared to have been pushed inwards so as to bruise the brain at the part above-mentioned. The fracture was continued through the sphenoid bone by the side of the left cavernous sinus, and at this part there was a considerable quantity of extravasated and coagulated blood beneath the dura mater.[9]

§ 5. *Orbit Fractured by a Blow on the Eye.*

The following case related[10] by Du Verney, has sometimes been referred to, as an example of this sort of injury; but it may fairly be doubted, if, in this instance, the fracture of the orbit was actually produced through the medium of the eyeball.

Case 10.—A gentleman had his left eye crushed to pieces by a blow from a stone, and the orbit beaten in upon the brain. After the first shock, his faculties remained entirely unimpaired, till his death, which happened on the 7th day, insomuch that some of his medical attendants pronounced it impossible the brain should be injured. On dissection, the cranium was found filled with brain in a softened state, mixed with fragments of bone. The whole substance of the brain, even to the cerebellum, was changed by disease. The anterior part of the sella Turcica was found broken.

§ 6. *Counter-Fractures of the Orbit.*

Fractures of the orbit sometimes take place, we are told, by what the French have called *contrecoup*,[11] in consequence of blows or falls on the forehead, or even on the occiput.

Case 11.—Bohnius[12] opened the body of a man who died in consequence of a blow with a stick, close to the right eyebrow. At the part struck, there was an ecchymosis, but no wound; beneath the ecchymosis, the bone was sound and entire; but in the roof of the orbit, there was a fissure, an inch and a half long, running towards the sella Turcica, and the corresponding portion of the dura mater was ruptured.

It is seldom, if ever, that such fractures are discovered till after death. Indeed, it is of comparatively little importance to know of their existence during life, as they do not admit of any particular treatment, and as our attention will be directed chiefly to the concussion, and consequent inflammation of the brain, by which counter-fractures are attended.

§ 7. *Penetrating Wounds of the Walls of the Orbit.*

The smoothness and mobility of the eyeball, together with its smallness, compared with the size of the cavity in which it is placed, and its firm resistance, compared with the looseness of the parts interposed between it and the orbit, serve to explain how pointed bodies, thrust against this organ, are very apt to leave the eyeball uninjured, and to penetrate deep into the orbit, or even passing through its walls, to enter one or other of the neighbouring cavities. The nasal and cranial sides of the orbit, from their situation and extreme thinness, are especially exposed to be thus injured. Perforation of the orbitary plate of the frontal bone, in particular, is an accident to which the attention of the surgical student is early and forcibly drawn. The thinness and fragility of that plate, the readiness with which the brain may be reached through it, and the

instantaneousness with which death has been known to follow such an injury, are among the earliest points impressed on the mind of the young anatomist. Thus Mr John Bell, after attributing the thinness of the orbitary plate to "the continual rolling of the eye," with which that plate never comes into contact, and by which, therefore, it cannot be thinned, tells us, that "it is the aim of the fencer; and we have known in this country," adds he, "a young man killed by the push of a foil, which had lost its guard."[13]

Various effects may follow a penetrating wound of the orbit, and we may find the patient in one or other of very different states. The weapon may have been immediately withdrawn after the injury was inflicted, or the foreign body may still be fixed in the wound, and is to be extracted, or it may have sunk so deep, that it cannot be laid hold of. As for the effects of the injury, they may be slight and transient, or violent and immediately dangerous, or prolonged for a length of time. It is evident, that a dagger, or other weapon, directed outwards, so as to break through the suture between the malar and sphenoid bones into the temporal fossa, or directed downwards, so as to shatter the floor of the orbit, and enter the maxillary sinus, will not be productive of the same amount of dangerous consequences, as when the instrument of injury traverses the os planum of the ethmoid, or the orbitary plate of the frontal. I shall treat of gunshot wounds of the orbit separately; but I may here remark, that their effects correspond so far at least with those of common penetrating wounds, that from both we may occasionally expect hæmorrhage, extravasation of blood, blindness, strabismus, syncope, vomiting, coma, convulsions, palsy, and even death, as immediate effects; and as remote effects, fever, delirium, suppuration, caries, exfoliation of bone, and the like.

1. *Trifling appearance of external wound.* A weapon penetrating through the orbit, may strike deep into the brain, and yet so small an external wound be present, as shall be apt to excite little or no suspicion of danger.

Case 12.—Ruysch relates the case of a man, who was wounded in the left orbit, with the end of a stick, not particularly sharp. The injury appeared of little importance; yet the patient died soon after receiving the wound. The magistrates appointed Ruysch to examine the body, in order to discover the cause of the sudden death. Externally, he observed a slight degree of ecchymosis at the upper part of the eye; but on removing the calvaria, he found that the wound had penetrated to a considerable depth into the brain. This, he observes, may happen very easily, on account of the thinness of the upper part of the orbit, in many cases not thicker than writing paper, and so brittle as to be perforated with the finger. Wounds, therefore, of the orbit, he concludes, are not to be considered as a matter of no moment, especially if the instrument by which they are inflicted is not blunt, or if those who are wounded become sleepy, sick, feverish, giddy, or convulsed.[14]

Case 13.—Peter Borel mentions a still more remarkable case, of a man who was wounded with a sword in the left orbit. Thinking that the wound had not penetrated deep, he merely covered it with a plaister; after which he walked two leagues, and ate and drank heartily with his companions, exactly as if he had been well, being affected with no pain. Next morning he was found dead. The skull was opened, when the wound was found to have penetrated to the cerebellum.[15]

Case 14.—Similar to this is Diemerbroeck's case of a young man, who received t thrust with a sword, in the inner canthus of the eye; the weapon, traversing he corresponding lateral ventricle, and slanting upwards, almost passed through he skull, at the upper angle of the lambdoidal suture. The patient remained in is usual state of mind, "mente sanus, bene videns, audiens, gustans, omnesque artes bene movens, ac cum sociis convenienter et bono cum judicio quacunque e re disserens," till the 10th day, when he was seized with violent fever, which n two days proved mortal.[16]

These cases are sufficient to show how cautiously our prognosis ought to be delivered, when a wound appears to have penetrated towards the roof of the orbit.

In the following case, symptoms of danger supervened early, and were treated with the appropriate remedies, although unfortunately without success.

Case 15.—A man was brought into the London Hospital, 12th April, 1832, with a lacerated wound of the right upper eyelid. He stated, that while working on board a ship discharging coals, a hook used for raising the coals, caught him by the eye, and he was elevated to the height of several feet. His companions observing what had happened, suddenly let go the rope in alarm, so that the poor fellow fell heavily on the deck. He immediately withdrew the hook himself. On his admission to the hospital, he did not appear to be suffering from any serious injury. The eyeball was found uninjured, and no fracture could be detected. His respiration was natural; his pulse 76, full, but not more than might have been expected in a robust man; pupils obedient to the light; no pain in the head. He was bled to the extent of twenty ounces; a cold lotion was applied to the forehead; and two grains of calomel were ordered to be given every second hour.

He passed a quiet night. Next morning, his pulse was 74, full, but free from hardness. He had very little pain in the head. His bowels had been opened three times. Twelve leeches were applied to the forehead, and the calomel continued.

Symptoms of compression of the brain came on very suddenly at six in the evening. His breathing became stertorous; pupils contracted, and insensible to the stimulus of light; pulse 52, and labouring; he could not be roused by any noise. At this time, a quantity of blood, mixed apparently with cerebral substance, to the amount of about two ounces, escaped from the wound. He was again bled to the extent of twenty ounces; the blood cupped and buffy. Twelve leeches were applied to the temple.

He lingered in this state till two o'clock next morning, when he died.

The orbitary plate of the frontal bone was found to be completely smashed, and a considerable portion of the anterior lobe of the right hemisphere of the brain wanting, it having escaped through the wound.[17]

2. *Differences in situation and extent of fractured orbit.* It is worthy of remark, that it is not the orbitary plate of the frontal bone alone which is apt to be fractured, when the weapon is directed towards the roof of the orbit; and that we are sometimes enabled to judge of the degree of violence, employed by the hand which wield the weapon, even by the mere situation of the fracture, which in fatal cases is detected on dissection.

The following case of fatal wound of the brain through the orbit and ethmoid bone, is quoted by Bonetus:—

Case 16.—A countryman, about 55 years of age, was asked by one who met him to step out of the way; but as he was carrying a heavy burden at the time, he could not do so, and therefore refused. The other, provoked at this, struck the countryman violently over the shoulders with a whip; and when the whip broke, thrust the sharp end of the broken shaft of the whip in the countryman's face. Not apprehending any dangerous effects from the blows which he had

received, the countryman, with his burden on his back, trudged along after his cart, which was loaded with wood, for nearly a quarter of a mile, till he arrived at the wood market, when he instantly dropped down dead.

Schmid was appointed to inspect the body. On examining the head externally, he found that the sharp end of the stick had penetrated at the inner canthus of the right eye. He endeavoured to ascertain with the probe whether the wound had reached the brain, but he could not, on account of the narrowness of the wound. Having opened the cranium, the brain and its membranes at first view appeared sound; but on raising the anterior part of the cerebrum, the nasal extremity of the falx was observed to be injured, and it was found that the wound had penetrated into the third ventricle, in which lay a considerable quantity of grumous blood.[18]

Case 17.—On the 20th of December 1819, I witnessed the examination of the body of a man, who, the evening before, had instantaneously dropped down dead, in a scuffle on the street, after receiving a penetrating wound of the orbit, with the pointed end of an umbrella. Considerable bleeding had taken place from the nose and mouth. The upper eyelid was swoln and livid, and the conjunctiva elevated by extravasated blood. Just over the tendon of the orbicularis palpebrarum, a penetrating wound easily admitted the little finger to the bottom of the orbit, between its nasal side and the eyeball. A fracture of the orbit was felt with the end of the finger. On opening the head, much dark fluid blood was found effused into the cavity of the tunica arachnoidea, and some between it and the pia mater. The dura mater was seen to be perforated by a lacerated wound, just under the edge of the boundary of the middle fossæ of the basis of the cranium, formed by the little wing of the sphenoid bone. The brain behind the wound of the dura mater was lacerated, and a small portion of it separated from the rest. On removing the dura mater, the fracture, which had been seen, indeed, immediately on lifting the brain, was displayed completely to view. The little wing of the sphenoid was separated by the fracture from the frontal bone, in the course of the sphenoidal suture. The fracture extended through the orbitary plate of the frontal from behind forward for about half its length; but what was much more remarkable, the comparatively thick and strong portion of the sphenoid, which completes the posterior part of the roof of the orbit, was broken across at its inner extremity; proving, along with the state of the dura mater and brain, the great degree of force with which the instrument of death had been driven against the hapless victim of a drunkard's fury. I may mention, that the optic nerve and eyeball were entire, the cornea clear, and the humours and retina uninjured.

Case 18.—Thomas Cuss, aged 22, a stout countryman, was admitted into Guy's Hospital, about 1 P.M. on the 4th of January 1830, on account of a wound of the left eye, inflicted by the point of an umbrella. When this patient entered the ward, his whole demeanour was such as if he were intoxicated; but Dr Bright afterwards learned that this was by no means the case, and that the symptoms were purely ascribable to the injury he had sustained. The patient would allow no examination of the wound. When put to bed, he complained of severe headach and of thirst. An hour afterwards he vomited blood. At about a quarter to three, he became so violent as to need a strait waistcoat. At nine, his pulse being full, strong and frequent, and the headach and delirium intense, he was bled till thirty-five ounces were abstracted, and a decided effect produced on the pulse. A purgative was then given, and he dosed quietly for a quarter of an hour. During the afternoon, he was for some time capable of conversing, and gave a collected account of his injury to another patient in the ward. At midnight his face became pale, and somewhat shrunk; at 3 A.M. difficult respiration came on; and he gradually sunk till he died at half-past four, without any convulsions.

On dissection, the eyeball was found to be destroyed. The vessels of the dura mater were turgid with blood, and the brain was every-where, especially towards the base, and the left side, covered by extravasated blood. On raising the brain, the dura mater was discovered to be torn by the anterior clinoid processes, which were driven inwards. The shattered bones of the orbit left an aperture through which the finger might be introduced. On examining the brain, it was found lacerated in the left fissura Silvii, the extravasated blood being derived from branches of the middle cerebral artery, the trunk of which had escaped. The

umbrella point had pierced the intervening parts to the left crus cerebri, which was quite destroyed. Beyond this, it had passed into the right lateral ventricle, and must have penetrated the central parts of the brain to the depth of at least two inches. The sphenoidal cells were extensively fractured. The quantity of blood effused at the basis of the brain was by no means great; and although the gradually increasing extravasation was probably one great cause of the patient's death, the incoherence and excitement which marked the few hours that he survived the accident, must be ascribed to the irritation and inflammation arising from the extensive laceration of the brain and its membranes.[19]

3. *Suppuration—Convulsions.* The case which I am now about to quote, serves at once to confirm what is proven by the preceding cases, namely, that at the first there may be nothing alarming, except the suspicious situation of the wound; exemplifies a symptom which has ever been regarded as an exceedingly dangerous, if not fatal one, in injuries of the brain, namely, convulsions; and illustrates, in accidents of this kind, both the date and the effects of suppuration. The earliness with which matter is formed by the tunica arachnoidea, in cases of wounded brain, is a remarkable circumstance, and is strikingly proven by the case already quoted from Sir G. Ballingall's Clinical Lecture.

With regard to the convulsions which are caused by irritation of the brain, and which, not unfrequently, appear immediately or very soon after a severe injury of the head, it may be observed, that they are probably the effect rather of pressure from fractured pieces of bone or effused blood, than of any change in the cerebral structure, and are attended with comparatively less danger than those caused by disorganization of the brain, consequent on inflammation. The latter usually occur along with strabismus and coma, some time after the setting in of the symptoms called *secondary*, from their occurring days or weeks after the injury, and are almost invariably the forerunners of death.

Case. 19.—A soldier was brought to the hospital at Brest, at eleven o'clock in the evening, having been wounded with a pitchfork, at the middle of the left upper eyelid. The wound was oblique, about three lines in length, and appeared to implicate only the skin and orbicularis palpebrarum; there was very little blood discharged; the eyelid was distended, and the conjunctiva inflamed. The apparent simplicity of the wound, the goodness of the pulse, and the free exercise of all the functions, led to a favourable prognosis; the patient asserted that he had experienced nothing particular at the moment of the injury, and had scarcely been stupified by it. Compresses dipped in brandy and water, were applied over the wound. The patient rested during the night; next day, he was quite lively, walking about in the wards, complaining only of slight pain in the wound, and even eating with appetite. The same day, at seven in the evening, he was seized with convulsions, which were supposed by his attendants, to be epileptic. The day after, he was kept from food, and bled at the arm; the convulsions returned, and he was bled at the foot. Vomiting, uneasiness, agitation, and delirium came on; the pulse became small and contracted; cold sweats succeeded, and the patient died at two o'clock next morning.

On dissection, the eyelids were found œdematous, and the wound had already closed. On cutting through the upper eyelid and orbicularis palpebrarum, a circumscribed collection of pus was found in the orbit, between its roof and the levator palpebræ superioris. This collection of pus communicated with the cranium, through the orbitary plate of the frontal bone, which had been penetrated by one of the prongs of the fork. After removing the eyeball, the inferior wall of the orbit was found fractured, and depressed almost completely

into the maxillary sinus. This fracture was without fragments, and is compared by M. Massot, the narrator of the case, to the depression which might be produced on the surface of an egg, by pressing it inwards with the thumb. On removing the calvaria, the dura mater was seen to be penetrated over the hole made by the fork in the roof of the orbit. The dura mater appeared in a morbid state at that place, the anterior fossæ of the basis of the cranium were covered with pus, the anterior lobes of the cerebrum were in a state of suppuration, and the rest of the brain healthy. M. Massot thinks it probable, that when the fork was pushed through the orbit into the cranium, the eyeball being fixed and violently pressed between the fork and the floor of the orbit, the thin plate of the superior maxillary bone could not resist this pressure, but sunk by the continued action of the fork upon the eyeball.[20]

4. *Palsy.* In those who survive wounds penetrating the sides of the orbit, we may expect occasionally to meet with paralytic affections.

The son of Gen. E. a student at the Polytechnic School in Paris, in fencing, received the end of the foil through the roof of the orbit, and became hemiplegic on the opposite side of the body. The eye was saved.[21]

A case of this kind is also recorded by Mr Geach of Plymouth. He does not, indeed, say that the wound penetrated into the brain, but merely that the instrument of injury struck against the inner side of the orbit; leaving it a matter of doubt whether the paralytic symptoms which followed were attributable to effusion within the cranium, or to a still more direct injury of the brain.

Case. 20.—A midshipman was wounded in a riot by means of a small sword, which, entering at the external angle of the left eye, passed quite through the eyeball, and struck against the inner part of the orbit. He instantly fell down senseless, with loss of speech, and hemiplegia of the right side. Blood was immediately drawn.

Next morning he was found lying on his back, with the right eye widely opened, and, though in a light room, with the pupil considerably dilated. This eye was incapable of discerning objects, never winking at the waving of the hand, or the close application of the finger, though sometimes it was convulsed. The left eye was extruded from its orbit, and though destitute of all its humours, was enlarged to the size of a pullet's egg. The pulse beat at long intervals, with a lazy motion, and stopped upon gentle pressure; the body was not feverish, but preserved a natural heat, the paralytic side, arm, and thigh excepted, which were livid, cold and rigid; the lancet was employed without exciting any sensation, and blisters lay on several days without raising any vesications: the benumbed parts were constantly bedewed with clammy sweat. The patient was devoid of anxiety, or inquietude, and the powers of life seemed to be almost suspended; purgatives produced no effect, and clysters, though repeatedly injected, were never expelled. The urine was in general emitted by drops only, but sometimes it would run off suddenly in a deluge; hearing was considerably impaired; the patient lay lethargic, and dead almost to every thing, though, by pulling the arms and shaking the body, by loud and frequent calling, and desiring him to extend his tongue, he would gape widely, and forgetting seemingly what had been said to him, keep his mouth wide open, when the tongue might be seen quivering and retracted. Five weeks passed in this state of insensibility; every thing he took was with voracity, but without relish or distinction.

About this time, a new symptom began to threaten; the jaw seemed to be moved with difficulty, and only liquids could be poured down; the hypochondria were hard and distended, and every effort to procure an intestinal discharge proved ineffectual; when very large eruptions of the miliary kind were suddenly diffused over the sound parts. From that critical moment, he perspired freely, and had an easy motion of the jaw; his urine was rendered in due quantity, and purgatives of the lenient kind easily operated; the hypochondria became soft; the discharge from the eye, which had hitherto been acrid, was now copious and

audable; the sound eye had its motion, he could see with it distinctly, and seemed in other respects sensible when roused from his stupefaction. Soon after, he could bear to be moved from bed to a chair without fatigue; the paralytic parts were rubbed with vinegar and mustard, and he took valerian and castoreum. A cataplasm had been applied to assuage the inflammation and swelling of the eye. Though several sloughs had been thrown off, and the suppuration was in large quantity, yet the bulk of the parts did not diminish, nor the inflammation lessen, till an astringent fotus of red rose-leaves and port-wine was applied, which so effectually braced up the relaxed parts, that the lids came to cover the deformity. A decoction of thyme and mustard was employed as a gargarism, to remove the suppression of voice. As soon as he began visibly to mend, he had sometimes loud and sudden bursts of laughter, and at other times a long-continued silent simpering, a species of convulsion not unlike that called by the Greek physicians, κυνικὸς σπασμός. When he attempted to walk, he had such gestures as accompany St Vitus' dance, and seemed a perfect idiot, throwing eagerly forward one leg, and dragging the other tremblingly after.

At the time when Mr Geach drew up his account of the case, the patient's appetite was natural, his sleep sound and refreshing, his hearing acute; he spoke, but drawled out his words rather indistinctly than articulately; the paralytic arm and thigh were again animated, and were recovering, but slowly, their power of flexion and extension. He remembered nothing from the moment he had received the injury to the time he recovered and sat up.[22]

The only comment which I think it necessary to make on this interesting case is, that the instantaneousness with which the patient fell on receiving the injury, looks very like the effect of a wound of the brain; while, on the other hand, the slowness of the pulse and the hemiplegia, are more the symptoms of pressure from effused blood. Even, however, on the supposition that the small sword had not penetrated through the ethmoid bone into the brain, the case becomes only the more remarkable; as, on that supposition, it would lead us to conclude, that a wound of the bones of the orbit, without perforation, might be attended by rupture of vessels within the cranium, and consequently with pressure on the brain, and paralysis.

5. *Foreign body remaining in the orbit.* In all the instances which I have hitherto quoted, the weapon, whatever it was, was instantly withdrawn on the injury being inflicted; but we must be prepared to meet with cases where the foreign body, which has been driven through the walls of the orbit, still remains in the wound.

In such cases, we instantly proceed to its removal; for there very soon follows such a degree of swelling as might prevent us from accomplishing the extraction without great difficulty, if at all; and were the weapon left, what could we expect but destructive inflammation of the eyeball, of the orbit, of the surrounding parts, and, among these, of the brain?

Case 21.—A labourer thrust a long lath, with great violence, into the inner canthus of the left eye of another labourer. It broke off quite short, so that a piece, nearly two inches and a half long, half an inch wide, and above a quarter of an inch thick, remained in his head, and was so deeply buried that it could scarcely be seen, or laid hold of. He rode with the piece of lath in him above a mile, to Barnet, where Mr Morse extracted it with difficulty; it sticking so hard, that others had been baffled in attempting to remove it. The man continued dangerously ill for a long time; at last he recovered entirely, with the sight of the eye, and the use of its muscles; but even after he seemed well, upon leaning forwards, he felt great pain in his head.[23]

In the days when javelins and arrows formed principal weapons

of war, many difficult cases of this sort must have occurred. Albucasis shortly relates two which had come under his care. In the one, the arrow entered at the nasal side of the orbit, and was extracted under the ear. The patient recovered, without any permanent injury of the eye. In the other case, a Jew was struck with a large unbarbed arrow from a Turkish bow, under the lower eyelid. It had sunk so deep, that Albucasis reached with difficulty the end of the iron, where it stuck upon the shaft. This patient also recovered without any serious effect.[24]

Very great force may sometimes be necessary for extracting a foreign body, which has been driven through the walls of the orbit. Paré's successful case[25] is well known, in which he was obliged, with a pair of farrier's pincers, to tear away from the Duke of Guise, the broken end of an English lance, which, entering above the right eye, and towards the root of the nose, penetrated as far as the space between the ear and the nape of the neck, tearing and destroying vessels and nerves in its course, as well as fracturing the bones; a description likely to recall to the classical reader, the fatal wound of Pandarus, in the Iliad :—

Ὡς φάμενος προίηκε, βέλος δ' ἴθυνεν Ἀθήνη
Ῥῖνα παρ' ὀφθαλμὸν, λευκοὺς δ' ἐπέρησεν ὀδόντας.
Τοῦ δ' ἀπὸ μὲν γλῶσσαν τρυμὴν τάμε χαλκὸς ἀτειρὴς
Αἰχμὴ δ' ἐξελύθη παρὰ νείατον ἀνθερεῶνα.[26]

Case 22.—Percy had under his care a fencing-master, who, in an assault, received so furious a thrust from a foil on the right eye, that the weapon penetrated nearly half a foot into the head, and broke short. The man fell down in a state of insensibility, and very soon the supervening swelling was so great as to conceal the foreign body. In order to lay hold of it, Percy opened and evacuated the contents of the eyeball. His forceps not being strong enough, he sent to a clock-maker in the neighbourhood, and borrowed from him a pair of screw-pincers, with which he laid hold as tightly as possible of the broken end of the foil, and thus succeeded in extracting it. The fencing-master died some weeks after, more from the consequences of intemperance than of the injury.[27]

Commenting on this case, Percy recommends that we should rather remove the eyeball, than leave large foreign bodies in such a situation; and refers, in support of this practice, to a case related by Bidloo, in which a splinter of wood was left to come away from the orbit by suppuration. The eye burst at last, after the most dreadful pain, and after the other eye had been threatened with destructive sympathetic inflammation.

Case 23.—Sabatier notices[28] an instance of wound with a knife, through the upper eyelid, with injury of the neighbouring edge of the frontal bone. It was not, he says, till after four hours' work, that the surgeon succeeded, by means of a hand-vice, in tearing away the portion of the knife-blade which remained in the orbit, on account of its projecting so little from the wound. The patient complained of severe pain, as if one had been tearing out his eye. No ill consequence followed; the cure was speedy, and without any affection of sight.

6. *Dangers after foreign body is removed.* We must not imagine that, on withdrawing the foreign body from the orbit, the danger is over. Destructive inflammation of the eye, or even fatal inflammation of the brain, may follow, as in the case I have just quoted from Percy: nay, the patient has been known suddenly to expire immediately after the foreign body was removed.

Case 24.—A robust labourer, aged 51 years, while cutting wood in a forest, on the morning of the 2d April, stumbled over the root of a tree, and with the whole weight of his body drove the end of a file, which he held in his hand, against his left eye. The file broke across, and a portion of it remained in the orbit. The patient was carried, in a state of insensibility, to a small town some miles off, where three surgeons tried by turns, but in vain, to extract the foreign body, which, with the probe and the forceps, they felt distinctly, through the wound, beneath the middle of the eyebrow. They enlarged the wound with the knife, and during three days made reiterated attempts at extraction; but the foreign body continued immoveable.

On the 4th day, the patient was brought to the surgical clinic at Prague. The eyelid was greatly swoln, and in the middle of it there was a triangular wound, with inverted edges. The eyeball was motionless, and was so pushed downwards and outwards that it almost lay on the cheek, carrying the lower eyelid before it. The cornea presented a more than ordinary degree of lustre. The patient was almost comatose.

Professor Fritz endeavoured, by means of strong pincers and polypus-forceps, to withdraw the foreign body, but these instruments bent under the pressure. At last, with a pair of small but very strong lithotomy-forceps, which he grasped with both his hands, he succeeded in extracting the piece of the file. It was triangular, measured an inch and a half in length, and was denticulated to its point, which was blunt.

The patient answered questions very slowly, or not at all; his face was pale and sunk, his eyes were shut, and he lay motionless, except that he often raised his left hand to the left side of his head. Respiration slow; pulse oppressed and hard. The wound gaped widely; the eyelid, almost completely divided into two lateral halves, was of a dark red colour, and so much swoln as to allow only a small portion of the displaced eyeball to be seen.

Notwithstanding the repeated use of venesection and of leeches, and constant cold applications to the eyes, the cornea filled with pus, and giving way about the 12th day, allowed the iris to protrude. The cornea was ultimately left in an opaque and atrophied state. The wound suppurated abundantly, and for some time a probe could be passed along it, in a direction backwards and inwards, beneath and through the orbitary portion of the frontal bone, to the depth of five inches, without causing pain. At length the wound closed, the upper eyelid remaining palsied. The patient's general health was perfectly restored.[29]

Case 25.—A girl, 10 years of age, playing along with other children, near a cotton-spinning machine, fell upon one of the pointed iron spikes, 5 or 6 inches long, on which the bobbin is placed. This instrument penetrated to the depth of about 2 inches into the orbit, between the inner wall and the globe of the eye, and then broke across, so that 2 or 3 lines' length of it projected above the level of the skin. Attempts were made to remove it, but so much difficulty was experienced that these attempts were not persisted in. Ten days afterwards the piece of iron was found protruded to the length of 9 or 10 lines; a month afterwards, it was still more protruded; in fact, it now held apparently so slightly, that it was laid hold of with the fingers and extracted. Scarcely had this been done, when the child was seized with convulsions, and died in a quarter of an hour. The sight had not been affected during the residence of the foreign body in the orbit, nor had its presence there excited any very marked symptoms. The child had always been able to go about.[30]

7. *Eyeball dislocated.* It is important to observe that mention is made by different surgical authors, of the eyeball being dislocated, or pushed out of its socket by a foreign body thrust into the cavity, or traversing the sides of the orbit. Now, in such cases, it is necessary not only to remove the foreign body, but to reduce the eye. This has sometimes been done with complete restoration of vision.

By being dislocated, or pushed out of its socket, is to be understood, that the eyeball is extruded beyond the fibrous layer of the

eyelids; that layer which is a continuation of the periosteum, and lies beneath the orbicularis palpebrarum. Of course, the optic nerve must be put on the stretch by such an accident, and the eyelids can no longer be made to close upon the protruded eyeball.

Case 26.—Mr B. Bell relates a case, in which the eye was almost completely turned out of its socket, by a sharp pointed piece of iron pushed in beneath it. The iron passed through a portion of the orbit, and remained firmly fixed for the space of a quarter of an hour, during which period the patient suffered exquisite pain. He saw none with the dislocated eye; and the protrusion being so great as to lead to the suspicion that the optic nerve was ruptured, Mr Bell doubted whether it would answer any purpose to replace it. He found, however, on removing the wedge of iron, which, being driven to the head, was done with difficulty, that the power of vision instantly returned, even before the eye was replaced. The eye was now easily reduced to its original situation; inflammation was guarded against, and the patient enjoyed perfect vision.[31]

8. *Foreign body not removed.* The foreign body, by which a wound of the orbit has been inflicted, has, in some cases, been left unremoved, from the fact of its presence not having been suspected, or from the surgeon not having instituted a sufficiently strict examination of the wound with the probe; while, in other cases, it has been left in the orbit or in the cranium, from an impossibility of removing it with safety.

With the exception of a remarkable case, which I shall presently notice, in which a tobacco-pipe was thrust through the spheno-orbitary fissure into the cavernous sinus, without fracturing the orbit, I do not recollect to have met in the course of my reading, with any instance of a foreign body driven through the orbit by mere manual force, and left within the cranium. Numerous cases of gunshot wounds, however, in which the ball or other foreign body was left within the cranium, are recorded; and it is evident that the effects, so far as the mere presence of the foreign body is concerned, must be much the same, whether it has passed through the orbit into the brain by manual or by gunshot force. Death, under such circumstances, is almost certain to be the result, either immediately or in the course of a few days; although some remarkable cases have happened, of extraneous bodies lying for years in the very brain itself, without causing any apparent inconvenience.[32]

As to foreign bodies, which have merely passed through one or other of the sides of the orbit, and are left remaining, they give rise to more or less irritation, destroy the bones more or less extensively, take different routes for their escape, but, in most instances, appear to pass either through the maxillary sinus, or by the spheno-maxillary fissure into the fauces, and are discharged in very various spaces of time.

Case 27.—Marchetti had under his care a beggar, who, asking charity rather importunately one summer day from a Paduan nobleman, this testy personage struck the beggar with the handle of his fan, in the inner angle of the eye, and with so much force, that a portion of the fan, three inches long, broke through the orbit, and sunk out of sight in the direction of the palate. When the man came to the hospital, Marchetti removed some small bits, which he found sticking in the angle of the eye, combated the inflammation, allowed the wound to close, and dismissed the patient as cured. In three months, he returned with a large swelling in the palate, which, when Marchetti cut into, his knife struck upon the

andle of the fan, which he immediately extracted with a pair of forceps. The atient speedily recovered.[33]

Case 28.—Mr White relates the case of a person, to whom it happened that, ; he sat in company, the small end of a tobacco-pipe was thrust through the iddle of the lower eyelid. It passed between the globe of the eye and the in- erior and external circumference of the orbit, and was forced through that por- on of the os maxillare, which constitutes the lower and internal part of the orbit. The pipe was broken in the wound, and the part broken off, which, from the ex- mination of the remainder, appeared to be above three inches, was quite out of ght or feeling, nor could the patient give any account of what had become of it. The eye was dislocated upwards, pressing the upper eyelid against the superior art of the orbit; the pupil pointed perpendicularly upwards, the depressor oculi as upon the full stretch, and the patient could see none with that eye. Mr White pplied one thumb above and the other below the eye, and, after a few attempts t reduction, it suddenly slipped into its socket. The man instantly recovered erfect sight, and suffered no other inconvenience than that of a constant smell of obacco smoke in his nose for a long time after; for, as he informed Mr White, he pipe had just been used before the accident. About two years afterwards, he alled upon Mr White, to acquaint him that he had, that morning, in a fit of oughing, thrown out of his throat a piece of tobacco pipe, measuring two inches, which was discharged with such violence, as to be thrown seven yards from the lace where he stood. In about six weeks, he threw out another piece, measuring n inch, in the same manner, and never afterwards felt the least inconvenience.[34]

In illustration of the great length of time, which a foreign body nay take in this way to escape, I may notice the following case, re- ated in a letter to Horstius:—

Case 29.—A boy of 14 years of age was struck by an arrow, while amusing imself in his play-ground. It stuck fast in the orbit, but the boy pulled it out, nd threw it on the ground. A surgeon arrived, to whom the play-fellows of the oy who was wounded showed the arrow, deprived of its iron point. With a probe he surgeon attempted to examine the wound; but, on the boy fainting, he desisted, o that the iron point was left in the orbit. The external wound healed, and the oy recovered; the eye remained clear and moveable, but deprived of sight. This happened in the beginning of August 1594, and nothing more was heard of he iron point, till October 1624; when, after an attack of fever and catarrh, with a great deal of sneezing, it descended into the left nostril, whence, taking the way of the fauces, it came into the mouth and was discharged. During the whole thirty ears and three months that it had remained in the head, it had not been produc- ive of any pain.[35]

The following is the interesting case of penetration of the caver- ious sinus, through the spheno-orbitary fissure, to which I have lready adverted:—

Case 30.—Michael Walsh, an Irish lad, 15 years old, and employed as a brick- ayer's labourer, quarrelled in the beginning of January 1832, with one of his ountrymen, whilst sitting at the same table, in a public house. During the heat f the argument, his opponent, who sat opposite to him, thurst a common clay obacco-pipe into the lad's eye, and made, apparently, a very deep wound. For everal days, nothing was thought of the event, and but little, if any, incon- enience experienced by the boy. About the 8th or 9th day, however, his ppetite was perceived to fall off; he became languid and feverish, and had fre- uent rigors, followed by severe pain of the head, especially of the sinciput. He pplied at the Westminster Ophthalmic Hospital, and a portion of tobacco-pipe, bout two inches in length, was extracted from the orbit by Mr J. R. Alcock. The boy was copiously bled and purged, but his sufferings continued to increase; he sight of the affected eye was lost; he became delirious; an urgent irritative ever succeeded; and it was inferred that suppuration was taking place within he cranium.

In this state, the lad was sent to the Westminster Hospital, on the 11th of anuary. He was sensible only at short intervals, and appeared to be suffering

the most excruciating pain; he was continually moaning, and rolling his head from one side to the other, or holding it fixed in a state of apoplectic insensibility. His pulse was 140, small, irregular, feeble; bowels acting imperfectly; skin of variable temperature. He had been bled to the utmost verge of prudence, and the only means that could be judiciously employed were merely palliative. His respiration became hurried; and at times laborious and stertorous, presenting nearly an apoplectic character. Blood was taken, after his admission, from the temporal artery, but no improvement was observable. The affected eye and its appendages were much swoln, but the wound was scarcely perceptible. He died on the 12th.

Much interest was felt in this case, for it was imagined the pipe must have broken the orbitary process, and penetrated the anterior lobe of the cerebrum. On raising the calvaria, the membranes were found a little more injected than natural, but no other morbid appearance was discovered in the whole cerebral mass, save a little opacity of the pia mater covering the pons Varolii. This was found to be opposite a portion of discoloured dura mater, extending over the left cavernous sinus. An opening was made into this cavity, and a piece of pipe, an inch long, was discovered thrust between the nervus abducens and the carotid artery. Extensive disorganization of course prevailed throughout the whole sinus; and the existence of a foreign body of such size, in such a centre of nervous sympathy, was considered not inadequate to account for the severity of the symptoms. No extravasation, however, had taken place, no penetration of the dura mater, nor any fracture of the orbitary plate. The pipe had passed under the roof of the orbit, and entered the cavernous sinus, by the spheno-orbitary fissure. The carotid, though contracted a little in diameter at its point of contact with the intruded body, was yet sufficiently pervious.[36]

§ 8. *Incised Wounds of the Orbit.*

Sabre wounds of the head have sometimes been attended by a cleaving of the orbit; and, in some rare instances, the orbit has been laid open, by an entire separation of part of its parietes, so as to expose its contents to view. The following cases illustrate this class of injuries of the orbit:—

Case 31.—Marchetti shortly states the case of a German soldier, who was wounded in the forehead with a broad and heavy sword. The frontal bone and the brain were divided, down to the eyes, and the patient was immediately deprived of sight. In two months, he recovered from the wound, but continued blind, with the pupils clear.[37]

Case 32.—Edward Power received a desperate wound with a back sword, extending from the top of the frontal bone to the orbit of the left side, forming an extended and frightful chasm, in which were included the bone, membranes, and brain. The wound bled considerably, and was for nearly three hours exposed to the open air, the patient not having so much as a rag to cover it. Fever and inflammation of the brain might have been apprehended; yet, by a couple of bleedings, and some other antiphlogistics, the man was completely cured in five weeks, without exfoliation, or the smallest operation.[38]

The following case shows the propriety of attempting union by the first intention, even when part of the osseous parietes of the orbit is completely separated by an incised wound.

Case 33.—A young man received a wound with a cutting instrument, extending obliquely from the upper part of the left temporal fossa, across the root of the nose, to the right fossa canina. This wound divided the skin, the temporal branches of the portio dura, the anterior auricular muscle, part of the temporal muscle, orbicularis palpebrarum, and corrugator supercilii, the frontal branch of the ophthalmic nerve, and the superciliary artery. These parts hanging over on the cheek, formed a flap, in which were also present a portion of the orbitary arch of the frontal bone and its external angular process, so that a portion of the cavity of the cranium was laid open, as well as the cavity of the orbit, exposing to view

e globe of the eye, and the motion of the brain. The nasal nerve and artery, e pyramidal muscles, and, to a small extent, the bones of the nose, were divided; om the nose to the right fossa canina, only the skin was divided. The portion brain laid bare appeared unhurt; the eye also seemed perfectly sound, none of parts having been touched, except the levator palpebræ superioris, which, ving been cut across in the middle, presented its anterior half in a state of re-xation, and dragged downwards and forwards by the flap which lay upon the cheek. The patient had neither experienced any concussion, nor become insensible; ut, when M. Ribes saw him, was in a state of considerable depression. A sur-on, who had been called before M. Ribes arrived, had already dressed the ound. Perhaps, in imitation of Magatus, who directs in such cases that a plate gold or lead, drilled through with holes, be applied over the dura mater, and at the edges of the wound be simply brought together, without supporting them sutures, this surgeon had placed between the lips of the wound a bit of linen read with cerate on both sides, in order to give vent to the suppuration, which o doubt would have followed; he had then brought the flap into its place, and pported it by a roller. M. Ribes removed the piece of linen, and brought the lges of the wound exactly together, retaining them by strips of adhesive plaister. a six weeks the patient was cured, without fever or suppuration.

The eye, however, which had been exposed, became blind, and the upper eye-d remained motionless. Ten years afterwards, the eye still preserved its form id transparency, but had shrunk in size. M. Ribes is of opinion, that the blind-ess in this case was a sympathetic effect, produced upon the retina by the division the branches of the fifth pair. He regards the retina, not as a mere expansion the optic nerve, but as a nervous membrane into which enter branches of the eat sympathetic, and of the ciliary or iridal nerves, as well as the fibrils of the otic nerve; whence injuries of the great sympathetic, or of the fifth pair, may, thinks, produce blindness, although in the first instance the optic nerve has not en affected.[39]

Although the separated piece of the orbit appears to have united this case, it sometimes happens that only the soft parts unite, hile the bones continue divided. Of this, we have an example in ie following case, related by Dr Hennen:—

Case 34.—An officer received, at the battle of Waterloo, a sabre-wound across e eyes, cutting obliquely inwards and downwards to such a depth as to admit of view of the pharynx. One eye was destroyed, and the hiatus was so great, that was necessary to support the upper jaw by morsels of cork put into the mouth, such a way as to act as fulcra, but admitting the passage of liquid nourishment. fter the wound was dressed on the field, the patient was sent to Brussels, where fell into the hands of a Belgian barber, who stupidly cut out the ligatures, re-oved the straps by which the lower portion of the face was kept in position, and uffed the parts with charpie. This was not removed for several days, after which e parts were again brought into apposition by straps and bandages, but with eat pain, and consequent delirium. The patient recovered, granulations sprout-g up at all points, and the soft parts uniting, but not the bones.[40]

§ 9. *Gunshot Wounds of the Orbit.*

Gunshot wounds of the orbit present much greater variety in their irection than any other wounds of this part. They also vary much in ie depth, extent, and effects of the injury which they produce.

1. *Exterior parts of orbit injured.* The superciliary ridge, and ie other exterior parts of the orbit, are often the seat of gunshot juries.

Sometimes a ball traverses the outer wall of the orbit; in other ases, the person bending forward at the moment of receiving the ound, the ball passes through the superciliary ridge. When the tter is the case, the ball generally descends afterwards through the

floor of the orbit into the maxillary sinus, or into the nostril, destroying the eyeball in its course.

The frontal sinus, when much expanded, separates the two tables of the orbitary plate of the frontal bone, so as to form a cavity, in which musket balls have frequently been known to lodge. This is generally attended by depression of the inner table, so as to render necessary the operation of trepan.[41] The surgeons of former days refrained from trepanning these sinuses, partly from fear of an incurable fistula following the operation, partly from the difficulty of sawing through two plates of bone placed obliquely in regard to each other, without wounding the dura mater; but the fear of a fistula is now laid aside, and the second difficulty is in some degree removed, by employing two trephines, a large one for the external, and a smaller one for the internal table. In this way, a depression may be raised, or a ball, fixed perhaps in the internal table, or in the roof of the orbit, may be removed.

Sometimes it has happened that a ball has been left in the frontal sinus.

Case 35.—The French general T. received a ball in the left orbit, at Waterloo. After lacerating the eyeball, it traversed the superior internal wall of the orbit, and lodged in the frontal sinus. It remained there for 12 years, without producing any remarkable effects, after which time the patient awoke one night with the sensation of something falling into his gullet. It was the ball, which he immediately coughed out.[42]

2. *Bones of orbit susceptible of re-union.* The bones of the orbit, shattered by a ball, are still, in some cases, susceptible of re-union, and ought not, therefore, to be hastily removed, although they are felt to be loose after an injury of this kind. The copiousness with which all the parts of the face are supplied with blood, communicates to its bones a power of recovery, greater than that usually found in the osseous system.

Case 36.—Poneyes had under his care a soldier, in whom a musket-ball had shattered the anterior part of the frontal sinuses, the upper part of the bones of the nose, and the right orbit towards the inner angle. He fell instantly on receiving the wound, vomited soon after, became insensible, and bled at the nose. Poneyes removed the portion of bone forming the frontal sinuses, leaving the bones of the nose and the injured portion of the orbit loose. The posterior part of the frontal sinuses was not fractured. Delirium came on with drowsiness; but after the patient was repeatedly bled, those symptoms ceased. The loose pieces of bone reunited, and the cure was completed in two months and a half.[43]

3. *Different directions of balls through the orbit.* Balls passing directly backwards through the orbit, are generally fatal, from entering the brain; whereas, those which enter the orbit obliquely, though generally destructive of vision, either by striking the eyeball, or dividing the optic nerve, very frequently leave the brain untouched.

Dr John Thomson mentions a case, in which the ball entered nearly in the middle between the frontal sinuses, passed across the left sinus, and seemed to lodge in the cavity of the orbit, producing blindness, with great swelling of the eye, and of the parts surrounding it. In another case, where the bullet entered the face on the upper and left side of the nose, and passed out anterior to the right

ar, the patient was affected with amaurosis of the right eye. The ft eye was similarly affected, in a case where the ball entered the ght side of the nose, and came out in front of the left ear. In one ase, the ball entered at the inner angle of the left eye, and passed t in front of the left ear. In another, the ball entered above e inner angle of the right eye, and passed out of the right ear. 1 both these cases, the eye of the side on which the ball passed was estroyed. In one case, in which the ball entered the right eye, id passed out midway between the left eye and ear, the left eye was ffected with amaurosis.[44]

Case 37.—Wepfer[45] has recorded the case of a person, accidentally shot by his low-traveller, while resting on the ground. The ball entered a little below the e of the right ear, and, passing behind the angle of the jaw, above the roof of e palate, and behind the root of the nose, traversed the left orbit, and made its it through the upper eyelid. The eye-ball was forced from its place, so that hung out of its socket, with the cornea in a state of laceration; and at the same ne a portion of the frontal bone was separated from the rest of the orbit. Blood as discharged from both apertures of the wound, and from the nostrils and mouth; id for some days it flowed whenever the patient made any exertion. In the course the cure, no pus came from the nose or mouth. The patient had no convulsions. e was always able to swallow, although at first he found it difficult to masticate, to open his mouth. The right eye and the neighbouring parts were ecchymosed r a number of days.

From the aperture caused by the exit of the ball, laudable pus was copiously scharged; an abscess forming above the inner angle of the eye, an incision was ade into it, above an inch in length, and kept open till some loose fragments of e frontal bone came away; after this it closed. At first the eyeball was not only truded from the orbit, but the muscles, lacrymal gland, and fatty cellular sub-ance were exposed to view. Pus was discharged, but not very copiously, from e orbit; the eye retreated into its place; and a thick fold of conjunctiva being moved with the scissors, the parts healed. Purulent matter was copiously dis-arged from the aperture near the angle of the jaw, which was kept open for ghteen weeks, till some fragments of bone came away; after which the patient rfectly recovered, but with the loss of his eye.

4. *Balls traversing both orbits.* Many instances are recorded of alls passing through the orbits from temple to temple.

Case 38.—Heister relates[46] a case of this sort. The person recovered; only became blind the very moment he received the shot, and remained so ever after. he entrance and exit of the ball were exactly in the angle which the zygoma akes with the process of the malar bone going up to join the frontal, and of urse the ball must have passed through the posterior part of each orbit, proba-y dividing both optic nerves, without wounding either the eyeball or the brain. ie eyes appeared quite clear, and without inflammation, but fixed, and totally prived of sight.

In such wounds, many different parts are exposed to injury; id by the subsequent effects, we may sometimes determine what ructures have actually suffered. The outer and inner walls of e orbit will be reduced to splinters, and, perhaps, the cribri-rm plate of the ethmoid; the temporal muscle and its aponeu-sis, numerous nervous filaments from the portio dura, and from the ree divisions of the fifth nerve, and numerous branches of the ex-rnal and internal maxillary artery, will be divided; while the nerves thin the orbit, as well as the muscles of the eye and the branches the ophthalmic artery, will suffer more or less severely.

A gunshot wound which traverses both orbits, must be regarded

as less dangerous than one in which the ball does not pass so directly across from one side of the head to the other; but either from being directed backwards in its course, enters the brain, or from its force being partially spent, lodges among the bones. Speaking of the wounded before Mons in 1709, Heister states, that for the most part, those who had received a wound only in one temple, died either immediately, or soon after.

Dr Thomson tells us, that he saw from eight to ten patients, after the battle of Waterloo, in whom musket-balls had passed behind the eyes from temple to temple. In all of them, there was great swelling, pain, and tension of the head and face. He mentions, that a careless examination would have led one to suppose, that in these cases the balls had entered the cavity of the cranium; and remarks, that cases of this kind are recorded, in which the blindness which followed is supposed to have been produced by the balls injuring the inferior part of the anterior lobes of the brain; but that, most probably, in such cases the brain is untouched.

In one case, observed by Dr Thomson, where the ball had passed behind the eyes from temple to temple, one eye was destroyed by inflammation, and the other affected by amaurosis. In another case, where the ball had taken precisely the same direction, both eyes were affected with amaurosis, without any inflammation being produced. He remarks, that in some of the patients in whom amaurosis had followed, there was reason to believe, from the course which the balls had taken, that the optic nerves were divided; but that in a considerable proportion of those so affected, it was obvious that the balls had not come into contact with those nerves. Various instances, also, occurred, in which the bullet, penetrating through both eyeballs, had passed behind the bridge of the nose, and left it unbroken. In one of the cases, in which the ball had passed below and behind the eyes, the patient was affected, at the end of some weeks, with painful spasms in the face, which, in their severity, and in their mode of attack, bore a striking resemblance to those of tic douloureux.[47]

Case 39.—A case by Valleriola is often quoted,[48] of a soldier through whose head a ball passed from temple to temple, entering by the left, and coming out a little higher on the right side. Apoplectic symptoms followed, from which he recovered; but he remained blind and deaf.

Case 40.—In one of the engagements between the French and the Algerines in 1830, a French corporal received a ball through the orbits. It entered an inch behind and six lines above the external angular process on the right side, and came out at the point diametrically opposite. The patient presented symptoms of concussion of the brain, and Dr Baudens[49] was of opinion that the anterior and inferior surface of the cerebrum was injured. Although gunshot wounds are not in general attended by hæmorrhagy, the patient, in this instance, was covered with blood, which flowed from the temples, and still more from the nostrils. When he arrived at the ambulance, he was in a state of syncope, which served to arrest the bleeding. The face was considerably swoln, and especially the naso-orbitary region.

The splinters were removed; the wounds were washed, dressed, and covered with large compresses wrung out of cold water. These were continued for six days, as well with the view of preventing inflammation within the head, as of

retarding the flow of blood. Dr Baudens did not wish to arrest the bleeding altogether, as it contributed, he thought, to the safety of the patient. During the first fifteen days, there was occasional delirium; but this symptom was moderated by cold applications to the head, along with the abstraction of blood by cupping between the shoulders. A multitude of small maggots formed in the orbits and nostrils. Fearing they might penetrate to the brain, Dr Baudens destroyed them by a weak solution of corrosive sublimate.

Among the effects of this injury, the following are particularized by Dr Baudens. A feather, pushed into the nostrils, produced no sensation, but any sharp body was distinctly felt. This organ, although not entirely deprived of sensibility, was not affected by any annoying itchiness from the presence of the maggots. The corneæ became opaque, and were destroyed, so that the eyes sunk. The sense of smell was lost, and the sensibility of the palate was blunted. The intellect was weakened. The patient preserved the memory of what had happened to him previously to the injury; but, after this, not even the incidents of the evening could be recalled in the following morning. He was not aware of the extent of his misfortune, and still cherished the hope of being restored to sight. The wounds were cicatrized two months after the receipt of the injury.

5. *Balls sometimes extracted from the orbit; in other cases left unremoved.* A ball which has penetrated through one or other of the sides of the orbit, may, in some cases, be detected and extracted. In other cases, it cannot be extracted, nor its course ascertained; so that, if the individual survives, it must be left to make its way out by the fauces, or by some other route.

Even grains of small shot, traversing the walls of the orbit, or fixing in them, should be traced, and, if possible, extracted. Left in the substance of the bones, they are apt to give rise to exostoses. In those cases in which a musket-ball is left, we must lay our account with caries, exfoliation of the bones, deep-seated formations of matter, sloughing of the mucous membranes, puffy swellings on the surface towards which the ball is approaching, and a very tedious recovery. Sinuses form, in such cases, before the ball makes its exit, and continue after it has escaped; and to dry them up is generally attended with danger. We must wait till the parts within have become healthy, and then the sinuses will close of themselves.

Case 41.—Dr Hennen mentions[50] the case of a soldier, who was brought to him some weeks after being wounded, for the purpose of having a ball extracted, which gave him excessive pain, impeded his respiration and deglutition, prevented his speaking distinctly, and kept up an irritation in his fauces, attended with a constant flow of saliva, and a very frequent inclination to vomit. On examination, it was found to be lodged in the posterior part of the fauces, forming a tumour behind, and nearly in contact with the velum pendulum. It had passed in at the internal canthus of the eye, fracturing the bone. Although blindness was the instant effect, the globe of the eye was not destroyed; and the remaining cicatrice, and the very inflamed state of the organ, were the only proofs that an extraneous body had passed near it.

Case 42.—One of the most remarkable cases of a ball penetrating through the orbit, and making its way out of the head, is that of Dr Fielding, who was shot at the battle of Newberry, in the time of the Civil Wars. The ball entered by the right orbit and passed inwards. After 30 years' residence in the parts, and a variety of exfoliations from the wound, nose, and mouth, and the formation of several swellings about the jaw, it was at last cut out near the pomum Adami.[51]

6. *Balls or other foreign bodies passing through the orbit, left within the cranium.* Although it generally happens that gunshot wounds of the orbit, penetrating into the brain, prove immediately

mortal, yet, in some rare cases, the ball, or other foreign body, has been known to remain within the cranium for a length of time, without producing much disturbance.

Case 43.—Petit related in his lectures, the case of a soldier, who received a musket-shot in the inner angle of the eye. It seemed a very simple wound, and healed under the common hospital treatment. The man thinking himself cured, determined to leave the hospital, although advised by the surgeon to remain some time longer. Scarce had he reached the door, when he was seized with rigors, obliged to return, and died in two days. On dissection, the ball was found lodged under the sella Turcica and optic foramina. An abscess was present in the brain.[52]

Case 44.—Dr Hennen mentions[53] the case of a French soldier, wounded at Waterloo. The ball entered the right eye; the left, though not in the slightest degree injured to appearance, became completely blind. Dr H. felt under the zygoma, and all along the neighbourhood of the wound, but in the puffy state of the parts could not detect the course of the ball. The patient himself was confident it had gone into his brain. He returned to France convalescent.

The following case of a gun-breech penetrating the cranium through the orbit, and remaining in the brain for two months, occurred to Mr Waldon of Great Torrington, Devon, and was communicated by Mr Abernethy to the Medical Society of London:

Case 45.—A lad of 19 years of age, about 5 o'clock in the afternoon, as he was shooting at a wood-dove, was knocked down in consequence of the bursting of the gun. No person being with him at the time, the first effects of the injury could not be ascertained; he was probably soon deprived of sensation and power by the accident, as he remained in the wood till the afternoon of the following day, comprising a space of 22 hours, during a very severe frost, and was found about sixty paces from the spot where the accident happened. On Mr Waldon's arrival, he found the patient in his perfect senses, notwithstanding the os frontis and the dura mater had been perforated a little on the right side and above the frontal sinus, and a considerable quantity of cerebrum was then upon his clothes, and exuding from the wound. From considering the nature of the injury, and the manner in which it had been inflicted, Mr Waldon concluded that only the breech, as it is called, which screws into the back part of the barrel of the gun, could have effected the mischief. On the gun being found, his conclusion was verified, the barrel being perfect, and the breech gone, having carried with it the whole of the wooden part of the stock on a plane with itself. Notwithstanding the patient being at this time sensible, Mr Waldon still doubted, from the force with which the breech must have been dislodged from the barrel, to overcome the resistance of the os frontis and dura mater, whether it might not be within the cavity of the cranium. In the most gentle manner possible, he introduced his finger as far as he judged prudent, in order to detect whether any extraneous body was lodged there or not, but without effect. The patient having lost a considerable quantity of blood, as appeared on examining the spot where he lay the preceding night, Mr Waldon judged it not expedient to open a vein, but contented himself, for that night, with wrapping the upper part of the face in a warm poultice, giving a laxative mixture, and ordering a strict antiphlogistic regimen. Next morning, to his inexpressible surprise, he was informed that the lad had passed a good night, retained his senses, and was in good spirits. On removing the cataplasm, he found that an immense discharge of bloody fluid had exuded from the cavity of the cranium. This continued for several days to be thrown out, to the quantity of at least a pint every 24 hours, by the pulsatory motion of the arteries. On removing, at the first dressing, some part of the cataplasm from the internal canthus of the left eye, Mr Waldon discovered by the probe, the head of one of the screw pins, (*Fig.* 1.) which fasten the lock to the stock, almost buried

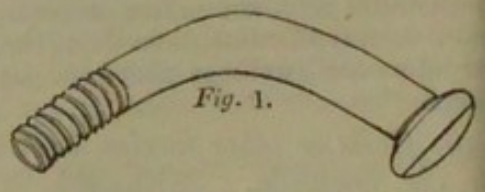

Fig. 1.

eneath the inflamed integuments, and which had penetrated the roof of the orbit pwards and backwards, through the cerebrum, towards the right parietal bone. t was extracted with some difficulty.

For some days, few or no unfavourable symptoms occurred, but a temporary oss of the power of associating ideas. The patient did not immediately recollect imself when awaking from sleep. The discharge continued profuse. On the norning of the 7th day from the time of the accident, Mr Waldon was alarmed y the coming on of drowsiness, stertorous breathing, and sinking of the pulse rom 70 to 55. Under these unfavourable circumstances, he ordered the fomentaions to be renewed, and made large evacuations. Next morning the patient vas greatly better; and from this period his convalescence daily became apparent. The tension of the integuments subsided, the pain of the head, hitherto violent, nd almost insupportable, left him, and laudable pus was evacuated through the pening in the frontal bone. In this state, he visited Mr Waldon's house, about he distance of two miles, every day, or every other day, sometimes on horseback, ftener on foot, to have his head dressed, without the least apparent fatigue or nconvenience.

Precisely in this state he continued till the 20th of January (the accident aving happened on the 29th of November), when he had a severe rigor, and complained of great pain in the back part of his head and muscles of the neck, with total loss of appetite, and inability to quit his bed. He had gone to a feast n the neighbourhood, where he had indulged more in eating and drinking than vas proper. Previously to this, nature appeared to be regenerating the lost erebrum, throwing out from its substance granulations of a faint blush colour. The symptoms of inflammation and formation of pus within the cranium, continued to increase till the 28th, when he was taken sick. During the act of vomiting, the attendants perceived on a sudden, a large projection on the right ide of the frontal bone, underneath the sound integuments, and about two inches rom the wound. On examination, Mr Waldon thought he perceived a large portion of the frontal bone detached, and in a state of exfoliation; and considered a free division of the integuments, and a total removal of the substance, whatever t might be, as affording his patient the only chance of recovery. As he was dividing the integuments, which, extraordinary as it may appear, were scarcely altered from a natural state, he perceived the knife to grate on a yielding body, which appeared very unlike bone; and he found not a little difficulty in effecting the division from the receding of this hard body, which he had hitherto considered as detached bone. When the division was completed, he perceived a round black body, which he immediately recognised as the breech of the gun. (*Fig.* 2.)

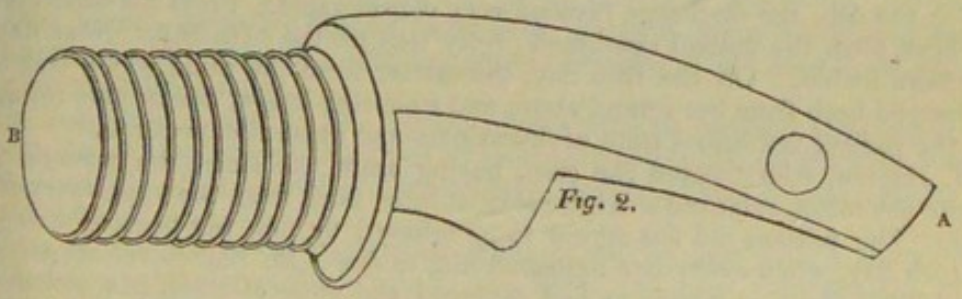

Fig. 2.

It was laid hold of, first with a pair of forceps, and then with the fingers, and, after some difficulty, extracted. It was three inches or more in length, and weighed three ounces and one drachm. It had lain in the brain, with the end A pointing to the occipital, and the end B to the frontal bone; and consequently must have extended nearly to the centre of the brain. The patient immediately became paralytic, and on the third day after the extraction, died under a complete subsultus tendinum. Leave to examine the head after death could not be obtained.[54]

7. *Balls or other foreign bodies passing through the orbit, and at the same time traversing the brain; partial loss of the substance of the brain, in gunshot wounds of the orbit.* The effects of such

wounds must, in general, be similar to those described in the following case by Wepfer, in which it is surprising that death did not ensue more speedily. Still more remarkable are those instances, in which gunshot wounds, traversing the orbit and the brain, have been followed by recovery.

Case 46.—A huntsman, says Wepfer,[55] holding the upper end of his gun with his hand, accidently touched the trigger with his foot. The piece went off, and two balls entering by the right side of the lower jaw, traversed the left orbit, and made their exit through the left parietal bone, near the lambdoid suture. The left eye was driven from its orbit. The patient's mind seemed entire, and he moved all his limbs, till the close of the 4th day. At that time he began to sing; but an hour or two before death, his speech became indistinct, although he still testified by nods that he understood what was said to him. He began to toss about his arms, as if in pain; short fits of a convulsive kind came on; he raved during the night; and died on the 5th day. During life, a copious ichorous discharge took place from the aperture in the jaw. On dissection, the course of the balls through the brain was traced from the parietal bone to the back of the orbit, and was observed to be filled with the same sort of ichor as had flowed from the jaw during life.

The following interesting case of recovery from a gunshot wound traversing the orbit and the cranium, in several respects resembles Mr Cagua's case of fractured orbit, referred to at page 4 :—

Case 47.—A lad of 17 years of age, was wounded by a musket-ball, which, passing from below upwards, penetrated through the upper lip, the right nostril, and the roof of the orbit into the cranium, whence it escaped at the upper part of the frontal bone near to the sagittal suture, where it made a large wound of the integuments, with loss of substance. Such a degree of swelling came on as made the head frightful.

An incision was made over the wounded part of the orbit, whence, at the first dressing, there came out a portion of both substances of the brain, in bulk about the size of a small hen's-egg. The eye was exceedingly swoln, especially the upper eyelid, into which an incision was made, to give issue to the blood which was supposed to be there extravasated; but, instead of blood, there came out a splinter of bone and a portion of both substances of the brain, nearly equal to a third of the portion which had formerly come away. The wounds were dressed lightly, and the patient was repeatedly bled. Some small portion of brain was again discharged. On the 4th day, the brain appeared to be in a state of suppuration; and on the 5th, the discharge became very considerable. From the time that he had been bled, the patient continued pretty well till the 11th day. Next day he was more feeble. On the 13th day, the matter from the brain which had been discharged both from the wound above and from that below, was in part retained, and the patient fell into a state of drowsiness and general depression.

M. Bagieu, who treated the case, having anew examined the wounds with minute attention, removed a large piece of loose bone from the upper part of the skull. The patient did not appear to be relieved by this, but became worse till the 15th day, when every one expected him to die. M. Bagieu remarked, that, on pressing the skin where he had removed the piece of bone, pus oozed out, which made him suspect that there was an accumulation of matter at that place. Led by this idea, he removed the skin and some portions of dura mater, so as freely to re-establish the discharge. The pulse rose, the patient was next day able to speak, and afterwards the suppuration slowly subsided. About the 19th day, the fleshy parts began to granulate, and the wound on the upper part of the head was soon covered over. It was otherwise with that of the eyelid, where supervened a considerable fungus, occasioned by the splinters separating from the neighbouring bone. In spite of cutting and burning this fungus, it was found necessary to wait patiently till all these splinters had come away; after which the excrescence was easily destroyed, the wound closed, and the patient recovered completely.[56]

The following successful case is related by Professor Ansiaux :—

Case 48.—Nicholas Joseph Brune, aged 17, wishing to unload a musket, began by extracting the balls with the common screw used for that purpose, but was foiled in attempting to remove the paper and the powder. He tried in vain to make the piece go off, priming it repeatedly for that purpose. At last, he resolved to bring the thick end of the ramrod to a strong heat, and introduced it into the barrel of the gun. The instant this was done, the powder exploded, and the ramrod was driven against the inner part of Brune's right orbit, where the os unguis is united to the nasal process of the superior maxillary bone. Directing its course upwards and backwards, it came out by the right side of the superior angle of the occipital bone, to the length of ten inches.

On hearing the explosion, the father in terror ran to the assistance of his son, who had fallen to the ground. He instantly raised him, and seizing the thick end of the ramrod with both his hands, drew it out of his head. About two ounces of blood flowed from the two openings, whence escaped also some portions of brain. A surgeon dressed the wounds, enjoined abstinence, but did not bleed. No bad symptoms occurred, except that the right eye became violently inflamed, and was lost. A considerable quantity of pus came from the wounds, and between the 36th and 52d days, some small exfoliations were discharged. Three months after the accident, the cicatrization was complete.

Professor Ansiaux afterwards repeatedly examined the patient, and exhibited him to his pupils. His health was perfect, and he was able to labour at hard work.[57]

8. *Part of the orbit shot away.* The temporal angle of the orbit is peculiarly exposed to this accident. Occasionally a considerable portion of the face, along with the lower edge, or even the floor of the orbit, is removed; and yet recovery may follow.

Case 49.—Captain M. aged 38, a French officer engaged against the Algerines, was wounded by a musket-ball, on the 1st of April 1836. It entered at the lower external part of the base of the orbit, and came out behind the ear, carrying away the malar bone, with the exception of a part of its superior surface, and of its superior and inferior angles, which, notwithstanding their being quite loose, Dr Baudens[58] did not remove. All the soft parts, as far as the ear, were lacerated, and presented a dreadfully contused wound, the bottom of which corresponded to the temporal fossa.

By gently introducing his finger along the groove of the wound, Dr B. withdrew some small splinters of bone, mixed with large clots of blood. He replaced the shattered bones which were still adherent, and preserved carefully the envelopes of the globe of the eye, the humours of which had been evacuated, in order to obtain a stump, moveable by the muscles of the eyes, upon which a glass eye might afterwards be placed. Having pared the edges of the wound, he brought them together by stitches.

The cure went on during two months; there were no cerebral symptoms; distressing tinnitus aurium was removed by local bleedings; the suppuration was not great; the edges of the wound united perfectly, leaving a linear cicatrice; there was no exfoliation.

Case 50.—Louis Vauté was struck obliquely on the face with a cannon-ball, which took away almost the whole of the lower jaw, and three-fourths of the upper. The two upper maxillary bones, the bones of the nose, the vomer, the ethmoid bone, both malar bones and zygomata were broken to pieces; the soft parts corresponding to those osseous portions destroyed; the right eye burst; the tongue cut across; the fauces, and posterior apertures of the nostrils completely exposed, as well as one of the glenoid cavities. Such was the state of the wound, that the comrades of this soldier had laid him in a corner of one of the French hospitals at Alexandria, in the belief that he was dead. Indeed, when Larrey first saw him, the pulse was scarcely to be felt, and the body cold and without the appearance of motion.

As he had taken nothing for two days, Larrey's first care was to administer to him, by means of an œsophagus tube, some soup and a little wine. His strength was re-animated; he raised himself, and testified by signs the most lively grati-

tude. Larrey washed the wound, removed the foreign substances which adhered to it, cut away the soft parts which were in a state of disorganization, tied several vessels which he had opened in doing so, and brought the flaps together as much as possible by stitches. He also united by stitches the two portions into which the tongue had been divided. He covered the whole excavation with a piece of linen with holes cut in it, and dipped in warm wine, and then applied fine charpie, compresses, and a bandage. Every three hours, a little soup and some spoonfuls of wine were given with the gum-elastic tube and funnel. The dressings were frequently renewed, on account of the flow of saliva and other fluids. Suppuration was established, the sloughs separated, the edges of the enormous wound approached each other, and the parts which were brought together adhered; 35 days after the injury, the man was in a state to be moved, and ultimately cicatrization was completed. After having been fed during the first 15 days through the tube, he was able to take nourishment with a spoon.

This patient returned to France, and 11 years afterwards, when Larrey published his work,[59] was alive, and in good health, in the *Hôtel des Invalides*. He could even speak so as to make himself understood, especially when the large opening into his face was covered with a gilt silver mask.

I have thus attempted to classify and illustrate the different injuries to which the orbit is liable, and the various effects which those injuries are apt to produce. There remain only two topics, on which I wish to say a few words.

1. *Prognosis.* It is evident, from the cases which have been passed in review before us, that although, in general, immediate death is the consequence of an injury extending through the orbit to the brain, yet this is not always the case; but that in some instances life has been prolonged for several days, and that in others the patient has completely recovered.

Putting aside the important question, whether or not large vessels have been ruptured, and blood extravasated, it is probable, that it is not so much the absolute amount of injury to the brain, as the suddenness with which it is inflicted, which renders wounds of the brain so generally fatal. We have examples of disorganization of very considerable portions of the brain proceeding slowly, and yet life prolonged for years; while in perforation of the roof of the orbit, the smallest wound of the brain may prove immediately mortal. Pathologists have generally attempted to explain the sudden and fatal effects of such wounds of the brain, by telling us, that thereby the heart, or the organs of respiration, are instantly deprived of the nervous energy necessary for continuing their functions.[60] But how it happens that death takes place instantaneously in some cases of this sort, while in others the person suffers so little from the sudden injury of the brain, but lingers, like Mr Waldon's patient with the gun-breech in his brain, or recovers, like Mr Cagua's and M. Bagieu's patients, we cannot tell, any more than we can explain how one man shall have a limb carried off, or shattered to pieces by a cannon-ball, without exhibiting the slightest symptom of mental or corporeal agitation, while deadly paleness, violent vomiting, profuse perspiration, and universal tremor, shall seize another on the receipt of a slight flesh wound. To say that all this depends on differences in nervous susceptibility, is only to repeat the fact in other words, not to explain it.

2. *General Treatment.* In regard to the general treatment of injuries of the orbit, it is very plain what that ought to be; namely, quiet and rest; a very spare diet; blood-letting, if the re-action demands it; opiates; laxatives; gentle diaphoretics; a little blue pill occasionally, if the liver becomes irregular in its action, as from confinement it is very apt to do; great cleanliness in regard to the injured parts; emollient cataplasms and soft light dressings, frequently renewed.

We must not neglect the use of blood-letting, but we must beware of employing this remedy too soon or too profusely. We must not omit to examine the injured parts frequently, in order, if there be any piece of exfoliated bone or foreign substance keeping up irritation, that it may be withdrawn, and as soon as the sloughs have separated, and the inflammation diminished, we must draw the edges of the wound together, and keep them as nearly as possible in contact with one another; but on the other hand, we must avoid too much poking and intermeddling, or attempting prematurely to close up the issues, by which matter and foreign substances may have still to escape. In some cases, it will be necessary to divide the soft parts, or even to apply the trephine, in order to allow an exit to extravasated blood, evacuate purulent matter, or remove depressed or detached pieces of bone.

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[1] Œuvres d'Ambroise Paré; Liv. x. cap. 9; Paris, 1607.
[2] Observations on Wounds of the Head; p. 107; London, 1776.
[3] Quoted from the Journal de Médecine de Corvisart, Dec. 1808, by Ansiaux, Clinique Chirurgicale; p. 48; Liége, 1829.
[4] Nouveau Système du Cerveau, par F. P. du Petit, contained in the Œuvres diverses de Louis; Tome ii. p. 41; Paris, 1788.
[5] Musæum Nosocomii Vindobonensis; p. 45; Vindobonæ, 1816.
[6] Clinical Lecture in the Royal Infirmary of Edinburgh, March, 1828; p. 5.
[7] Philosophical Transactions for 1740; Vol. xli. Part ii. p. 495.
[8] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. ii. p. 92; Berlin, 1821.
[9] Bright's Report of Medical Cases; Vol. ii. p. 36; London, 1831.
[10] Mémoires de l'Académie Royale des Sciences, Année 1703; p. 355; Amsterdam, 1738.
[11] Chopart, Mémoire sur les Lésions de la Tête par Contrecoup; p. 1; Paris, 1771.
[12] De Renunciatione Vulnerum; p. 168; Lipsiæ, 1755.
[13] Bell's Anatomy; Vol. i. p. 49; London, 1811. The thinness of the orbitary plate, like the thinness of the middle of the os ilium, or scapula, must be regarded as the natural constitution of the bone, and not at all as the effect of pressure by the brain, or rolling of the eye.
[14] Ruyschii Observationum Centuria; Obs. 54; Amstelodami, 1691.
[15] Petri Borelli Historiarum et Observationum Centuria II; Obs. 19; Francofurti, 1676.
[16] Anatome Corporis Humani, ab Diemerbroeck; p. 637; Ultrajecti, 1672.
[17] Lancet, May 12, 1832, p. 190.
[18] Joannis Schmidii Miscellanea; quoted by Bonetus in his Sepulchretum; Tom. iii. p. 380; Lugduni, 1700.
[19] Reports of Medical Cases, by Richard Bright, M.D.; Vol. ii. p. 611; London, 1831.
[20] Journal de Médecine, Tome iii. p. 530; quoted in the Dictionnaire des Sciences Médicales; Tome xxxvii. p. 558.

[21] Traité Théorique et Pratique des Blessures par Armes de Guerre, rédigé d'après les Leçons Cliniques de Dupuytren, par Paillard et Marx; Tome ii; p. 216; Paris, 1834.

[22] Philosophical Transactions for 1763; Vol. liii. p. 234.

[23] Philosophical Transactions for 1748; Vol. xlv. p. 520.

[24] Albucasis Methodus Medendi; Lib. ii. cap. xciv. p. 166; Basileæ, 1541.

[25] Paré, Apologie et Voyages; Voyage de Boulogne, 1545.

[26] Iliadis Homeri, v. 290.

[27] Manuel du Chirurgien-d'Armée; p. 111; Paris, 1792.

[28] Médecine Opératoire; Tome i. p. 409; Paris, 1822.

[29] Fischer, Klinischer Unterricht in der Augenheilkunde; p. 32; Prag, 1832.

[30] Demours, Traité des Maladies des Yeux; Tome ii. p. 45; Paris, 1818.

[31] Bell's System of Surgery; Vol. iv. p. 162; Edinburgh, 1801. The author of the *Dictionnaire Ophthalmologique* has entirely misunderstood this case; he tells us that the optic nerve was wounded *(très-blessé)*, which forms no part of Mr Bell's statement; and very improperly throws doubts upon that gentleman's veracity.

[32] See Quesnay sur les Plaies du Cerveau, Mémoires de l'Académie Royale de Chirurgie; Tome ii. p. 131; 12mo; Paris 1780.

[33] Petri de Marchettis Observationum Sylloge; Obs. 23; Londini, 1729.

[34] Cases in Surgery, by Charles White, p. 131; London, 1770.

[35] Gregorii Horstii Observationum Lib. i; Operum Tom. ii. p. 226; Norimbergæ, 1660.

[36] Lancet, February 11, 1832; p. 715.

[37] Op. Cit. Obs. 17; Londini, 1729.

[38] O'Halloran on Injuries of the Head, in the Transactions of the Royal Irish Academy; Vol. iv. p. 157.

[39] Mémoires de la Société Médicale d'Émulation; Vol. vii. p. 86; Paris, 1811.

[40] Hennen's Observations on some important points in Military Surgery; p. 370; Edinburgh, 1818.

[41] Baudens, Clinique des Plaies d'Armes à feu; p. 162; Paris, 1836.

[42] Ibid. p. 163.

[43] Mémoires de l'Académie Royale de Chirurgie; Tome vi. p. 202; 12mo; Paris, 1787.

[44] Thomson's Report of Observations in the Military Hospitals, after the Battle of Waterloo; p. 64; Edinburgh, 1816.

[45] De Affectibus Capitis Internis et Externis; Obs. 11. p. 27; Scaphusii, 1727.

[46] Medical, Chirurgical, and Anatomical Cases and Observations, translated by Wirgman; Obs. lxxiv. p. 92; London, 1755.

[47] Op. Cit. p. 65.

[48] Memoirs of the Literary and Philosophical Society of Manchester; Vol. iv. p. 23; Manchester, 1793.

[49] Op. Cit. p. 127.

[50] Op. Cit. p. 361.

[51] Philosophical Transactions, abridged by Jones; Vol. v. p. 203.

[52] Garengeot, Traité des Opérations de Chirurgie; Tome iii; Obs. xx. p. 155; Paris, 1731.

[53] Op. Cit. p. 361.

[54] Memoirs of the Medical Society of London; Vol. v. p. 409; London, 1799. A case of a gun-breech driven into the brain through the frontal bone, and remaining there for 27 days, is recorded by Dr Rogers, in the Medico-Chirurgical Transactions, Vol. xiii. p. 283; London, 1827. The patient recovered with the loss of an eye.

[55] Op. Cit. Obs. 15. p. 33.

[56] Mémoires de l'Académie Royale de Chirurgie; Tome i. Partie ii. p. 127. 12mo; Paris, 1780.

[57] Clinique Chirurgicale, par N. Ansiaux; p. 276; Liége, 1829.

[58] Op. Cit. p. 151.

[59] Larrey, Mémoires de Chirurgie Militaire; Tome ii. p. 140; Paris, 1812. Vauté survived his wound 18 years, and died a violent death in the hospital at Charenton. A sketch of his appearance during life is given in the Dictionnaire

s Sciences Médicales, Tome xxix. Pl. 2; and a figure representing his cranium
a dissection, in the Journal Complémentaire du Dictionnaire, Tome viii. p. 119.
60 'Les playes du cerveau et des membranes sont mortelles le plus souvent, à
cause que souventesfois s'en ensuit ablation de l'action des muscles du thorax, et
les autres servants à la respiration: dont de necessité la mort s'ensuit.' Paré,
iv. x. Chap. 10.

ECTION II.—PERIOSTITIS, OSTITIS, CARIES, AND NECROSIS OF THE ORBIT.

We have hitherto considered the orbit merely as a part exposed to a variety of external injuries. We must now turn our attention to it as a part subject to inflammation and its consequences.

It is generally admitted that the bones are susceptible of the same diseases as the soft parts; only, on account of the mineral matter which they contain in the proportion of about 2 to 1 of animal matter, the whole of the processes, whether natural or morbid, which go on in the bones, take place with less rapidity, and fewer manifestations of vitality, than do similar changes in the soft parts. Inflammation in particular, ulceration, and mortification, with all their concomitant phenomena, proceed in general very slowly in bones. We meet indeed, with both acute, and chronic inflammation of the bones; but the chronic is much the more frequent. The periosteum, with which they are every where closely invested, possesses a much greater degree of vitality than the bones themselves; and as this membrane is not merely adherent to their surfaces, but sends innumerable vessels into their substance, we find the bones very much affected in every case in which the periosteum is diseased.

It is an old and a just notion, that the dura mater, making its exit by the numerous foramina of the cranium, is continued into the periosteum. The envelope, which the optic nerve derives from the dura mater, having reached the point of origin of the recti muscles of the eye, splits into two laminæ, the exterior of which is lost in the periorbita, while the interior, which is whiter, denser, and thicker, goes on closely to surround the neurilema of the nerve, and ultimately becomes continuous with the sclerotica. Between these two laminæ, a canal is formed for the transmission of the ophthalmic artery. It is not by the optic foramen alone, however, that the dura mater enters the orbit. The dura mater closes in part the spheno-orbital fissure, and sends into the orbit by this opening a prolongation, which is also continued into the periosteum of the orbit. Through this prolongation, the 3d and 4th nerves, the 1st division of the 5th, and the 6th, enter the orbit, and the ophthalmic vein escapes from it.

Causes. Inflammation of the bones and periosteum (*ostitis* and *periostitis*) of the orbit may be the result of different causes; for

example, 1st, Injuries, perhaps producing fracture; 2d, Cold, and other common causes of inflammation; 3d, Syphilis, scrofula, or other diseases of a constitutional nature, acting locally; and 4th, The spread of inflammation from the neighbouring parts, and especially from the soft parts contained within the orbit. We should call the first three examples *primary*, and the last *secondary* inflammation of the orbit. The first and third set of causes are much more apt to induce inflammation of the bone and caries, if the patient be scrofulous, or syphilitic.

Inflammation of the periosteum or of the bones of the orbit, primarily or secondarily excited, may terminate by resolution. If the periosteum is left in a thickened state, the term *node* or *periostosis* is applied to the swelling. If an increased deposition of osseous matter is left in the inflamed bone, or on its surfaces, *hyperostosis* or *bony node* is the term used. Periostitis or ostitis may terminate in the formation of pus, and this may be deposited either between the periosteum and the bone, or in the cancelli. When the disease proceeds to ulcerative absorption of the bony substance, it is styled *caries*; if it ends in the death of the inflamed piece of bone, *necrosis*.[1]

Arising from causes of the first or second set above enumerated, periostitis or ostitis of the orbit, is more apt to run an acute course, and to be attended with severe pain, fever, and immediate danger, than when causes of the third or fourth class are in operation. When acute, pus is likely to be deposited between the periorbita and the bones; the eyeball to be displaced, if the disease is completely within the orbit; and sympathetic inflammation to be excited in the membranes of the brain, terminating fatally. Chronic cases, again, are more likely to end in thickening of the periosteum, or destruction of the bones.

I do not consider it necessary to describe, further than I have done, the inflammatory effects of those injuries of the orbit, which form the subject of the preceding section. In penetrating wounds especially, and in gunshot wounds of the orbit, we must lay our account with inflammation of the bones and periosteum, followed by suppurations, sloughings, sinuses, caries, necrosis, and tedious exfoliations.

Demours speaks[2] of *primary* inflammation of the orbital periosteum as extremely common; but the symptom to which he refers, is evidently nothing more than the circumorbital neuralgia, which, increasing every evening and relaxing every morning, is an attendant on some of the internal ophthalmiæ. It seems more reasonable to refer the pain, in such cases, to the branches of the 5th nerve, than to the periosteum.

The most frequent cause of *secondary* inflammation of the bones of the orbit, is supposed to be inflammation of the orbital cellular substance, or of the lacrymal gland, going on to suppuration, and the abscess, either from misapprehension or neglect, not being opened; while, in some cases, severe inflammation of the eyeball spreads not only to the surrounding soft parts, but also to the peri-

steum and the bones. Orbital tumours, running into suppuration, ometimes produce similar effects.

Inflammatory affections of the bones of the orbit occur in various situations, and in different degrees of extent. Its exterior margin, ast within its cavity, the fossa lacrymalis, the middle part of one r of several of its parietes, and the apex of the orbit, where it ommunicates with the cranium, are the several situations where the ones have been met with in a diseased state.

I. The symptoms in *acute* inflammation of the periosteum and ones of the orbit, may be gathered in some measure from the two llowing cases; and also from a case of periostosis, to be quoted n the beginning of next section. The case of a lady, related by Dr Abercrombie,[3] in his section on inflammation of the dura mater, n whom a swelling of the upper eyelid being punctured, purulent natter was discharged, and on a probe being introduced deep into he orbit, the bone was felt bare, bears in some respects on our present ubject. The pain in the left temple, with which the patient was uddenly seized, at the commencement of her illness, appears attri- utable to inflammation of the periosteum lining the roof of the rbit, and it may even be doubted, how far the fatal inflammation f the dura mater and tunica arachnoidea on the right side, was ot a sympathetic effect arising from the previous disease of the eft orbit.

Case 51.—A boy, aged 15, had a swelling of the right cheek, and pain of he teeth. After some days, the pain removed to the left side of the head, here it occupied entirely the eye and its dependencies. He then had irregular ttacks of fever, with want of sleep and loss of appetite, and about the 7th day onsiderable delirium. On the 8th day, the left eyelid was swoln so as to close he eye, and on raising it, the eyeball appeared unusually prominent. He had ausea, and severe headach, but was quite sensible, and the fever was moderate; ome delirium occurred towards night, and the swelling extended beyond the eye- ds over the forehead. On the 9th day, there was permanent delirium; on the 0th, coma and death.

The left eyelid and the integuments of the left side of the forehead, were im- ued with purulent matter; the frontal bone was denuded and carious for a con- iderable space; the abscess penetrated the orbit, and pus was found in its upper nd back part, where the bone was also denuded. The caries of the frontal bone ccupied its whole thickness, and extended in length somewhat beyond the roots f the hairs, and transversely from the external orbitar process beyond the nose.

The dura mater was detached and covered with pus over a space corresponding ith the external disease, but it was not detached from the superior part of the ault of the orbit. The arachnoid was covered with purulent matter; there was ery little fluid in the ventricles, and the brain in other respects was healthy.[4]

Case 52.—Master T. aged 14, remarkably tall for his time of life, full, but not nuscular, subject to frequent feverish attacks, on the 1st September 1816, had a mall irritable tumour on the right side of the bony arch of the nose. In a day or wo, it became inflamed and erysipelatous, and occupied all the teguments on the ight side of the nose. On the 5th, feverish symptoms ran so high, although he ad used fomentations and purgatives freely, that ℥xij of blood were taken from he arm. On the 6th, lbj was taken with apparent relief. On the 8th, the swelling till continuing to extend to the right eyelid, and the pulse being strong and hard, leeding to lbj was repeated. On the 9th, the disease seemed so far mitigated, hat an attention to the state of the bowels alone appeared necessary. In the vening, however, he became comatose, and occasionally delirious, with a slow ull pulse. A pound of blood was taken, and a blister applied to the neck.

On the 10th, he had a violent convulsive fit, after which he was nearly comatose, and respiration stertorous. Pulse about 120, full and throbbing. The nose, right eyelid, and teguments of that side of the forehead erysipelatous; both eyes closed; the parts so tender that the slightest touch gave exquisite pain, and roused him from his coma. Some pus had come from the right nostril, and a little had been spit up, mixed with blood. The temporal artery was opened, ℥xx of blood were taken from the arm, and sixteen leeches were applied to the temples. The head was kept cool with ice. This last measure appeared to afford considerable mitigation to the pain, but no permanent advantage followed. In the evening, ℥xx more of blood were taken from the temporal artery.

On the 11th, he seemed to suffer much, as he constantly moaned, but was unable, even when roused, to articulate. A spot over the right eyebrow, to which he with difficulty raised his hand, was the most painful part. On opening the palpebræ, the pupils looked large, and immoveable, and a layer of clear coagulable lymph formed a coating over each cornea. Leeches, blisters, &c. were resorted to; but he died on the morning of the 12th.

On raising the scalp, the pericranium covering the os frontis on the right side, appeared thicker than natural, and was in some parts of a dark-red colour; it was completely detached from the subjacent bone, and its inner surface was covered with thick purulent matter of a light-green colour. On slitting down the membrane as far as the superciliary ridge, a considerable quantity of purulent matter escaped from all sides, and a probe was easily passed backwards into the orbit between the bone and the periosteum, and downwards behind the temporal muscle, as far as the back of the palate.

On raising the skull-cap, the outer surface of the dura mater was found, in an extent corresponding to the limits of the detached pericranium, to be separated from the internal table of the skull: it presented a dull and flocculent surface, and was smeared with a greenish puriform mucus. The structure of the inner surface of the dura mater was less altered, but it was more generally covered with purulent matter; this was observed in considerable quantity on that part of the membrane which invests the anterior part of the right hemisphere, but there was no part of the internal surface of the dura mater which did not exhibit traces of suppuration.

The pia mater was, perhaps, more vascular than usual; but the arachnoid membrane was perfectly transparent, and no effusion had taken place upon its surface, except upon the upper part of the anterior lobe of the right side, where the pia mater, for the extent of about two inches, was in a state of suppuration. This diseased part exactly corresponded, in situation and extent, with a large patch of thickened and inflamed pericranium of a dark-red colour. The brain was perhaps more vascular than natural, and there was about an ounce and a half of water in the ventricles.

The right side of the face was somewhat swoln, and the upper eyelid protruded beyond the eyebrow. An obscure fluctuation could be felt beneath the integuments of the upper part of the nose. On cutting down to the bone, a considerable quantity of purulent matter issued from beneath the periosteum which was found to be in a state of suppuration, and so extensively detached from the subjacent parts that a probe could, with great ease, be passed between that membrane and the bones, either upwards upon the os frontis, backwards along the roof of the orbit into the cranium, or downwards upon the maxillary bones into the mouth.

Sir P. Crampton, connecting the history of this case with the appearances after death, concludes that the disease, in its commencement, was an inflammation of the periosteum, investing the bones of the nose. In the progress of the disease, the membrane which covers the bones of the face and head became affected, and ultimately the investing membrane of the brain itself. So long as the inflammation was confined to the periosteum of the face, the symptoms were moderate; but as it extended to the pericranium and the dura mater, the fatal train of symptoms which uniformly attend inflammation of the latter membrane, immediately set in, and ran their accustomed course.[5]

In the severe diseases illustrated by the preceding cases, however

limited the inflammatory affection of the periosteum or bones of the orbit, it is evident, that very active antiphlogistic measures will be required. The division, also, of the inflamed periosteum with the knife, as soon as the symptoms are sufficiently indicative of the nature and seat of the affection, should be attempted.

II. In *chronic* cases of periostitis or ostitis of the orbit, whatever part of the cavity is affected, and from whatever cause the disease originates, we generally find the eyelids more or less red and swoln, hot and painful, and often exceedingly œdematous. At length, a particular spot of the upper or lower lid points, and bursts, the opening generally continuing for a long time to discharge thin purulent matter; round the opening, the skin is depressed, and sometimes extensively ulcerated, but more frequently the aperture becomes fistulous, and occasionally it is surrounded by fungous granulations. The probe, passed along the fistulous opening, comes into contact with bare rough bone, in the state of caries or of necrosis; exfoliation sometimes takes place; and at last, after a course of months or years, the parts heal, the external aperture closes, and in doing so, the integuments adhere to the periosteum, leaving a deeply depressed cicatrice, with more or less shortening of the lid, a symptom termed *lagophthalmos*, and with more or less *ectropium* or eversion. There are thus four stages in the course of such an affection of the orbit; first, the stage of pure inflammation; secondly, that of abscess; thirdly, that of fistula; and fourthly, that of distortion.

1. *External margin of the orbit affected.* Chronic inflammation of the bones of the orbit occurs more frequently at the outer-inferior angle of that cavity, than at any other part of its extent. The occasion of the disease is commonly found to have been a fall, or a blow; and the patients are generally children, who have suffered, or are still suffering, from scrofulous affections of other bones, or of the glands. Over the malar portion of the edge of the orbit, generally with pain, and external redness, but occasionally without either, a swelling makes its appearance, and by and by is felt to fluctuate. One or both lids generally become at the same time œdematous, the conjunctiva reddens, the eye is intolerant of light, and the patient is more or less feverish. The swelling becomes dark-red, and more and more prominent; it points, breaks, and discharges thin matter. The opening thus formed, is close to the edge of the orbit. The swelling falls, but does not go entirely away. The external redness continues, with scrofulo-catarrhal inflammation of the conjunctiva. The matter discharged from the opening is generally thin, but sometimes thick and curdy, and occasions excoriation of the neighbouring skin. The edge around the opening becomes inverted, and adherent to the periosteum. On introducing a probe, the periosteum feels as if swoln and loosened from its natural attachment to the bone, and in general the bone is felt bare and rough. The œdema falls, and the conjunctivitis subsides, except that a few vessels continue to run towards the cornea, which is often nebulous. By the sinking of the skin, the lid is dragged towards the sinus, is much

everted, (*Fig.* 3.) and ultimately adheres to the periosteum. The longer the discharge continues, with caries probably, and small exfoliations, so much the more intimate are the adhesions. On dissecting a scrofulous child, in whom an adhesion existed between the lower lid and the edge of the orbit, in consequence of caries of the latter, Dr Ammon[6] found so intimate a union of the bone, periosteum, and thinned but indurated lid, that it was impossible to separate these several parts; they formed a firm, cartilaginous-like fibrous mass.

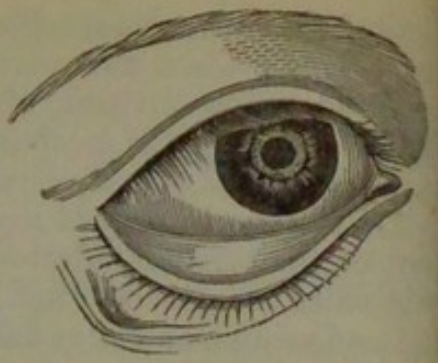

Fig. 3.

2. *Caries just within the cavity of the orbit.* I have met with several cases, in which a fluctuating swelling having risen just under the eyebrow, generally about its middle, and having given way and discharged matter, a fistulous opening continued for a length of time, leading to a rough and bare portion of the roof of the orbit. Almost all the subjects of this chronic affection were old people, unable to assign any cause for the inflammation, which, at first, wore the aspect of an attack of erysipelas. In one old man, a patient at the Glasgow Eye Infirmary, first the one orbit, and after it healed up, the other also became affected. In one individual, considerable shortening of the lid was produced, so much so that the eye being imperfectly covered, it inflamed, and an abscess formed in the cornea. I am unable to say what was the ultimate result in this case, but there was reason to fear that the cornea would give way, and the eye become staphylomatous. In the greater number of cases of this sort (*Fig.* 4.) which I have seen, the fistulous opening has ultimately closed, without leaving any considerable lagophthalmos.

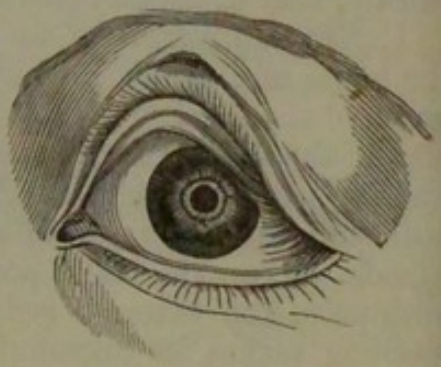

Fig. 4.

3. *Secondary caries of the fossa lacrymalis.* A suppuration within the orbit, close to the external angular process of the frontal bone, followed by a fistulous opening leading to the fossa lacrymalis, and ultimately attended with a great degree of ectropium and lagophthalmos, (*Fig.* 5.) occurs not unfrequently in scrofulous children, and is generally regarded as the result of inflammation of the lacrymal gland. The inflammation is supposed to spread from the cellular substance of the gland to the periosteum, which separating from its natural connexions, or secreting pus on its internal surface, the

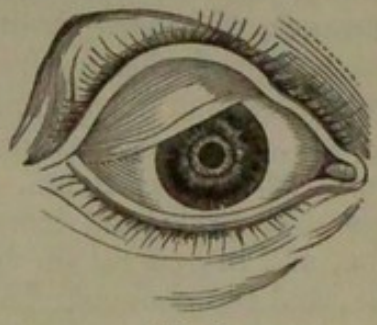

Fig. 5.

bone perishes to a certain extent by necrosis, or falls into a state of ulceration.

4. *Deep-seated secondary caries of the orbit.* Inflammation of the orbital cellular substance, going on to suppuration, may take place, more or less deeply within the cavity of the orbit; between the orbitary plate of the frontal bone, and the levator palpebræ superioris; or below the eyeball, between the rectus inferior oculi, and the floor of the orbit. Inflammation and suppuration in these situations are attended with pain and fever, immobility and distortion of the eyeball, and much swelling of the eyelids. If the disease be understood from the first, and treated on an active antiphlogistic plan, suppuration may probably be prevented; if matter has actually formed, any very serious or extensive injury may still be obviated by opening the abscess sufficiently early; but neglected or misunderstood, an abscess, even when not very deeply-seated, but perhaps pointing and fluctuating through one or other eyelid, may spread its mischief to the periosteum and bones, or insinuate itself into some of the neighbouring cavities, into the nostril by the lacrymal passage, into the zygomatic fossa by the spheno-maxillary fissure, into the maxillary sinus through the floor of the orbit, or even into the cavity of the cranium through the orbitary plate of the frontal bone. The matter will penetrate through the bones in the last two cases, by the process technically called *progressive absorption*, a process by which the bones pressed upon, are thinned and partially removed, but are seldom left in the state either of caries or necrosis. It is where there is no perforation from the orbit into the neighbouring cavities, but merely a spreading of inflammation to the periosteum and bones, that caries or necrosis is most apt to take place.

Of a still more dangerous character is inflammation in the back part of the orbit, or in the cellular membrane immediately surrounding the optic nerve. Vision is always injured, and often destroyed, by suppuration in these situations; the eyeball is pushed forward from its natural place; not unfrequently *exophthalmia* follows close upon this state of *exophthalmos*, that is to say, the eyeball is affected with inflammatory disorganization as well as protruded; nay, I have known deep-seated abscess of the orbit to prove fatal, the patient having for a day or two shown symptoms of pressure on the brain, and in fact dying apoplectic. I need scarcely say that in such cases, the periosteum and bones of the orbit will be very apt to suffer, especially if the disease is prolonged, and no attempt made to evacuate the abscess which may have formed.

It occasionally happens that several different portions of the orbit are affected at the same time, ending in the formation of a number of sinuses, passing through the eyelids in the direction of the diseased pieces of bone, and sometimes opening in the temple. In these cases the integuments are always puffy and greatly swoln. Such a state is commonly the result of severe and general inflammation of the orbital cellular membrane, running on into suppuration. When the floor or the inner wall of the orbit is the seat of caries or necro-

sis, excited in this way, we almost always find that the whole thickness of the bones has in a greater or less extent been destroyed, permitting the matter to drain from the orbit into the nostril or into the maxillary sinus. A case of this kind is related in a desultory and tedious manner, by Demours.

Case 53.—The patient was a canon of Besançon, in whom it would appear that suppuration had entirely destroyed the cellular membrane of the orbit, and that a part of the upper lid had been lost by gangrene. The eyeball was destroyed, the upper lid was everted and shortened, and there were four fistulous openings into the orbit, two at the upper edge, and two at the inner canthus. Fœtid matter, mixed with curdlike substance, was discharged, some pieces of bone came away, and injections passed for a time from the orbit into the maxillary sinus and nostrils; at last the discharge ceased, the parts became quiet, the sinuses closed, and a glass eye was applied to cover as much as possible the deformity. The general health does not appear to have been affected. The chief local treatment consisted in mild injections, frequently repeated in the course of the day.[7]

Case 54.—Saint-Yves mentions his having treated a lad of 15 years of age, who had had an abscess under the eyeball, which had burst through the middle of the lower eyelid. On passing a probe through the opening, he found that the matter, lodging under the globe of the eye, had produced caries of the floor of the orbit. The matter had flowed into the maxillary sinus, and was discharged in part by the nostril. Fearing that the presence of pus in the maxillary sinus might bring on caries of that cavity, Saint-Yves extracted one of the molares, the root of which he thought likely to penetrate into the sinus, and then employed injections, morning and evening, through the opening in the eyelid. The fluid injected ran through the maxillary sinus, and through the alveolus, into the mouth. The injection employed was a decoction of aristolochia, gentian, and myrrh. In two months the patient was cured.[8]

Although caries of the orbit is generally attended by abscess of the soft parts in its neighbourhood, (if it has not itself originated in such abscess,) the skin of one or other eyelid inflaming, and at length giving way, and an external fistula forming, yet cases may occur in which the disease shall be situated very deep in the orbit, in the sphenoid bone, for example, where it gives passage to the optic, or other orbital nerves, so that amaurosis may be brought on, any suppuration of the soft parts lie long concealed, or even death ensue, before any external marks of the disease be present.

5. *Syphilitic caries of the orbit.* When the bones of the orbit inflame from syphilis, after pain in the neighbourhood of the diseased part, not in general acute, there appears a swelling of the eyelid, slightly red at first, and but little painful to the touch, but which slowly advances in redness, pain, and prominence, till it is felt to fluctuate, and either bursts of itself, or is opened with the lancet. It is but rarely that an opportunity is afforded of watching the invasion and progress of such a case. Much more frequently the patient applies for aid, only after the abscess has burst and discharged matter for a length of time.

It is evidently impossible to decide, from a mere examination of the diseased bone, what has been the nature of the inflammation in which the caries or necrosis has originated, whether syphilitic, or scrofulous, or scorbutic, or of what other kind. We must refer to the history of the case and the constitutional symptoms, in order to determine, if possible, this point.

In syphilitic cases, we might be led to expect considerable pain, aggravated during the night; although nothing of this kind existed in the only case of syphilitic caries of the orbit which I have seen. Other bones, besides those of the orbit, are likely in such cases to be affected with similar disease. The bones of the nose, and the frontal bone where it forms the forehead, are much more apt to be affected with syphilitic inflammation, than are the walls of the orbit. In the case to which I have just referred, both orbits were affected, and it appeared that the patient had had a similar disease of the right acromion, a painful node on the left side of the forehead, and repeated chancres and buboes, during the eighteen months preceding the disease of the orbits. Such a history naturally led to the conclusion that the disease of the orbits was syphilitic.

Case 55.—Mr Hawkins, in a paper on Syphilitic Pains and Diseases of the Bones, refers to a case in which the orbits appear to have been the last parts affected. He speaks of it as the most frightful example of syphilitic disease of the bones which he had witnessed. The skull is preserved in the museum of the London Royal College of Surgeons, along with a preparation of the scalp, showing the great extent to which it also had been destroyed by ulceration. The disease of the bones reaching into the orbits, produced complete and disgusting eversion of the eyelids, and the case terminated in total blindness. The brain was little disturbed by the great extent of the disease, till the last two months of the patient's life, when frequent convulsions took place, with gradual loss of the mental faculties.[9]

Case 56.—William Broadfoot, aged 52, admitted into the Edinburgh Royal Infirmary, under the care of Mr Liston, 30th September 1829, presented an ulcer of malignant aspect, about three inches long and two broad, over the os frontis, immediately above the left eye, with a dark livid appearance of the surrounding integuments, which were tense and somewhat elevated. The edges of the ulcer were thickened and much everted, the granulations unhealthy, and the discharge thin and acrid. The sore had commenced five years before, consequent upon the ulceration of a small hard tumour, which had been in an indolent state during the previous 18 months. The os frontis was partially denuded, and felt rough on examination with a probe. The left eye protruded, and was much disorganized, but still obeyed its muscles. Over the right parietal bone there was a tumour of considerable size, soft and œdematous.

Eighteen months before his admission, he had been suddenly seized, when in bed, with loss of sensation and voluntary motion; from which state he gradually recovered, but never regained the power of raising his head. He had had a syphilitic affection when 23 years of age, for which he had taken a great quantity of mercury.

There was considerable projection of the lower cervical and upper dorsal vertebræ; the neck was much shortened; the chin rested on the upper part of the sternum, and he complained of great pain in the shoulder and elbow-joints. He could not move his fingers freely, and was unable to raise himself in bed; his health was greatly impaired, he took little food, and was much enfeebled and emaciated.

Poultices were applied to the sore, and endeavours made to support his strength by nourishing food. His bowels were kept regular, and anodynes were exhibited.

On the 21st October, the vision of the left eye was found to be gone, and the organ was much protruded. No appetite; much thirst; pulse rapid and weak; profuse perspiration.

On the 23d, he was unable to open his mouth, so that scarcely any food could be introduced. The eye had collapsed. He sunk gradually, and died on the 26th.

The tumour contiguous to the ulcer contained cerebral substance, broken down and mixed with pus. The os frontis, excepting a small part of its right margin, was completely destroyed. The greater part of the left parietal bone, the anterior

portion of the left temporal, and the whole of the left orbitary process of the frontal bone, were also entirely destroyed. Their situation was occupied by numerous small, irregular fragments of cancellated bone, which appeared to possess but little vitality, and were imbedded amongst a greyish-coloured substance of almost fluid consistence; they partially adhered to the dura mater, which was slightly thickened, and of a spongy texture on its serous surface. The margins of the deficiency in the cranium were extremely irregular and serrated, much loosened in texture, and apparently approaching a state of necrosis. In consequence of the deficiency in the upper wall of the left orbit, and its communication with the cranial ulcer, its cavity was partially filled with pus, and with the gray pultaceous mass in which the dead portions of bone were imbedded; the eyeball was thereby protruded, and was found completely disorganized. The zygomatic arch was partially destroyed, and portions of the ethmoid bone were also diseased. The bodies of the fourth and fifth cervical vertebræ were extensively absorbed.[10]

Prognosis. It is evident that both the prognosis and the treatment will be different in different cases. In a healthy adult, in whom the affection of the bones is the result of an injury, the prognosis will be much more favourable, and the treatment more simple, than in a scrofulous child, or an individual whose constitution is imbued with the poison of syphilis, or impaired by frequent courses of mercury.

In respect to the prognosis, I may mention that the eye is in danger of being destroyed in cases of caries of the orbit, simply in consequence of the lagophthalmos, or incapability of closing the eye, owing to the shortening of the lid. In almost every case of caries of the orbit which I have seen, there was either eversion, or lagophthalmos, or both; and in consequence of the eyeball being but partially covered when the patients attempted to shut the eyes, there was always inflammation of the conjunctiva, sometimes inflammation and nebula of the cornea. In an instance, to which I have already referred, in which the lagophthalmos was to a great extent, the upper eyelid being permanently drawn by the sinus upwards and backwards into the orbit, so that a very considerable portion of the eyeball was continually exposed to the contact of the air and of foreign particles floating through it, there were pustule of the cornea and onyx. I was consulted only once in this case, but I have no doubt that the cornea would soon after be so much affected as to give way, and the eye be ultimately left staphylomatous or atrophic. The caries affected the roof of the orbit immediately behind the middle of the supra-orbitary arch.

Treatment. The treatment will vary according to the different stages of the disease. In the first or purely inflammatory stage, it should be solely antiphlogistic, our object being to prevent suppuration. In the second stage, namely, that of abscess, we must endeavour to procure absorption of the matter, or give it vent externally. In the third stage, namely, that of fistula, our object is to arrest the ulcerative process going on in the bone, and to promote exfoliation of any part of it which may be in the state of necrosis. In the fourth stage, or that of distortion, the ends we have in view are to bring the lid into a natural position, and to obviate the bad effects arising from the exposed state of the eyeball.

The treatment in the first and second stages, is so obvious, that I need not enter into a long detail of particulars. The remarks which follow, refer chiefly to the treatment to be followed in the third and fourth stages.

It is evident, then, that, in the first or inflammatory stage, leeches should be applied liberally around the orbit. I am the more disposed to advise this, in all cases of contusion of the edge of the orbit, from having met with cases of this kind, which having been thought of too lightly, and therefore not treated with leeches, ran the course already described; but which, it is probable, might have been prevented from doing so, had proper antiphlogistic means been employed.

Our antiphlogistic and sorbefacient means failing to prevent or to dissipate suppuration, the abscess which has formed in the second stage, is to be opened as far from the edge of the eyelid as can be conveniently done, in order to avoid as much as possible the eversion which is apt to follow.

In the third stage, our object is, if the disease be caries, to arrest the ulcerative process going on in the bone; if necrosis, to promote the separation and expulsion of the portion which is deprived of life.

It will rarely be possible to decide at first sight, whether the bone which is felt bare with the probe, is carious or necrosed, or whether both caries and necrosis are present. The exact condition of the diseased bone will become evident only in the course of the cure, from the sensations communicated through the medium of the probe, the fœtor emitted, the appearances of the discharge, and the texture and size of the pieces of bone which come away.

We shall seldom be able to assist in arresting the ulcerative process, or in promoting exfoliation, without dilating the opening communicating with the diseased bone. This may be done partly with the knife, partly with tents. The fistula may first of all be enlarged, by means of a bistoury; and then kept open, by a dossil of lint, dipped in oil, and pushed along until it comes into contact with the diseased bone.

In cases of children, or of adults who are afraid of the knife, we may be induced to dilate the fistula by sponge-tent, although this is in fact the more painful method of the two, so painful indeed that it sometimes cannot be borne. If there are fungous granulations round the opening of the fistula, these may first of all be destroyed with lunar caustic. If there be no fungus, the pointed pencil of lunar caustic may at once be introduced into the fistula, and turned round two or three times, so as to enlarge it. A piece of sponge-tent is then to be introduced, and kept in for 10 or 12 hours. Thicker and thicker pieces of sponge-tent are then to be employed, till the opening becomes large enough to admit a dossil of lint, which is to be renewed daily.

Various applications have been recommended in cases of caries and necrosis; but perhaps nothing is so much deserving of confidence

as lunar caustic, either solid or in solution. Its effect is to kill that part of the bone which is in a state of caries; and to promote the separation of what is already dead. Every second or third day, a strong solution of this substance may be injected along the fistula, taking precautions against the solution being allowed to touch the eye; or the caustic pencil may be conveyed into contact with the bone, and kept there for a minute or two.

There is reason to believe that sometimes diseased portions of bone are absorbed by the granulations with which they are in contact, so that the part heals up without any discharge of bone; but in general, no cure takes place unless bone comes away. The coming away of the bone is not always evident. It sometimes separates in minute scales, sticking to the dossil of lint, or washed out by the injection; while in other cases, a considerable portion is thrown off at once, is felt with the probe to be loose, and is to be extracted with the forceps. There is no stated time for the necessary exfoliation in such cases. It may take place in a month; or many months may elapse before the diseased bone comes entirely away. As soon as we judge it probable that the whole diseased part has been removed, we lay aside the dossil of lint, and allow the opening to close.

I do not imagine that in cases of caries or necrosis of the bones of the orbit, there ever is any considerable formation of new bone. All that nature effects in such cases, is, I believe, a healing up of the diseased part, without any attempt to restore what has been removed by ulcerative absorption, or by exfoliation. Fortunate indeed must the case be regarded, when the former process ceases, or the latter is completed, so that the diseased bone may heal, and the external wound be allowed to close, and this without any considerable deformity. The eversion of the eyelid, the impossibility of covering the eye, and the deformity caused by the retraction of the external aperture of the fistula, are events very annoying under any circumstances. Suppose the patient to be a young lady, naturally anxious about her appearance, I need scarcely say how meritorious the surgeon will be in her judgment and that of her friends, if the case is brought to a speedy and favourable termination, especially if they have ever witnessed the deformity and the destruction of the eye which may have been the result in less fortunate cases of the same disease.

It may sometimes happen that we are deceived in regard to the state of the bone. The fistula may even close, and yet the bone continue diseased. Granulations may fill up the sinus, without its bottom being sound. Perhaps some trifling exfoliation has taken place, without the whole diseased piece of bone having come away; and the surgeon, misled by appearances, and thinking that all is right, does his best to close up the sinus. Nothing, however, is gained, if the bone is still left in a state of disease. On the contrary, we are only obliged to go over again the same process of dilatation, and to wait for renewed exfoliation.

The exfoliation and healing up of diseased bone is throughout an

organic process, and may unquestionably be assisted by whatever remedies tend to support or improve the general health. In syphilitic cases, mercury, sarsaparilla, and other anti-venereal remedies, are to be employed. In scrofulous cases, tonics, such as sulphate of quina, along with a nourishing diet, and country air, will be found advantageous. I have no experience of the power of asafœtida, and a variety of other internal remedies, which have gained a reputation for promoting the exfoliation and healing up of bones. If they act at all, they probably do so merely as stimulants or tonics, without any of the specific power over diseased bone, which has been attributed to them.

Unless when the separation of the diseased portion of bone and the healing up of the sinus have been more than commonly prompt, it is rarely the case, that recovery takes place from caries or necrosis of the orbit, without a considerable degree of distortion of the eyelids.

The *lagophthalmos* in such cases is generally relieved in part by a loosening of the retracted eyelid, effected slowly by the natural action of the orbicularis palpebrarum. Should this prove insufficient to enable the eyelids to close, the operations for eversion, to be afterwards described, modified according to the circumstances of the case, might perhaps prove useful.

Case 57.—In a patient who was under my care, at the Glasgow Eye Infirmary, with caries of the roof of each orbit, and lagophthalmos of each upper eyelid, the eyelids came very gradually to close more and more upon the eyeballs. For a time, however, the lagophthalmos was to such a degree, as to leave the conjunctiva constantly exposed to the irritation of the air, and the particles of dust floating through it. The conjunctivitis and corneitis thereby excited, I treated chiefly by the application of lunar caustic solution, till the elongation of the eyelids, produced by the action of the orbicularis palpebrarum in winking, rendered the lagophthalmos gradually less and less, and served at length to permit the eyeballs to be almost completely covered. When this patient was dismissed, the sinuses had long been healed. There still remained a slight speck on one of the corneæ; and an evident deficiency was felt at the part of each orbit which had been the site of the caries. The solution of 4 grains of lunar caustic to the ounce of distilled water was of signal service in this case, moderating the external inflammation of the eyeballs, brought on from their state of exposure, and in fact saving the eyes, till the natural apparatus of protection was in a great measure restored to the exercise of its office.

In cases of more considerable lagophthalmos, it is curious to observe the degree of accommodation effected by the lid which is free, for supplying the defective action of the lid which is fixed, so

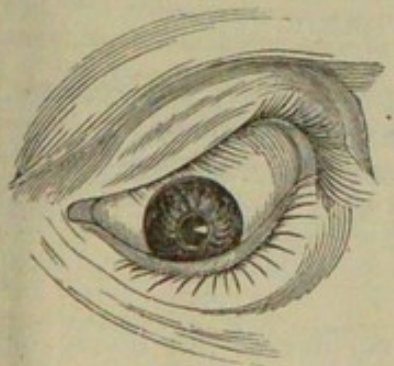

Fig. 6.

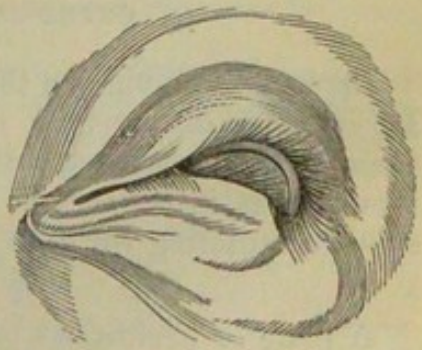

Fig. 7.

as to lubricate the eyeball in the act of winking, and protect it from the intrusion of foreign particles. The upper lid for example, being fixed to the roof of the orbit, the appearance, when the eye is open, is such as is represented in *Fig.* 6 ; when the individual winks, the upper lid not being capable of descending over the eye, the vicarious lower lid is thrust up, as in *Fig.* 7, so as to meet the upper lid, and almost to cover the eye. This muscular exertion is, unfortunately, available only while the patient is awake.

I need scarcely say that it would be folly to attempt the cure of the *eversion* consequent to diseased orbit, if the fistula were still open, or the bone unsound. Were we to detach the eyelid from the edge of the orbit to which it is fixed, replace it in its natural position, and endeavour to keep it so, perhaps by extirpating a portion of the exposed and thickened conjunctiva, or cutting out a triangular piece of the whole thickness of the eyelid, and then bringing the edges of this incision together by stitches, so as to make the lid sit close, as in the natural state, upon the eyeball, we should merely lose our labour ; for the disease of the bone not being removed, the eyelid would very soon return to its former malposition. The operative means to be adopted after the bone is perfectly healed, we shall consider more fully in the third chapter, under the head of *ectropium.*

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[1] See Dr Cumin's Paper on the Diseases of the Bones ; Edinburgh Medical and Surgical Journal ; Vol. xxiii.

[2] Demours, Traité des Maladies des Yeux ; Tome i. p. 91 ; Paris, 1818.

[3] Pathological and Practical Researches on Diseases of the Brain and Spinal Cord ; p. 29 ; Edinburgh, 1829.

[4] Quoted by Dr Abercrombie from the new series of the Journal de Médecine; Tome xi. p. 523.

[5] On Periostitis. By Philip Crampton, M.D. Dublin Hospital Reports; Vol. i. p. 337 ; Dublin, 1818.

[6] Zeitschrift für die Ophthalmologie; Vol. i. p. 41 ; Dresden, 1830.

[7] Op. Cit. Tome ii. p. 33.

[8] Saint-Yves, Nouveau Traité des Maladies des Yeux ; p. 80 ; Paris, 1722.

[9] London Medical and Physical Journal ; Vol. lvii. p. 318 ; London, 1827.

[10] London Medical Gazette ; Vol. v. p. 843 ; London, 1830.

SECTION III.—PERIOSTOSIS, HYPEROSTOSIS, EXOSTOSIS, AND OSTEO-SARCOMA OF THE ORBIT.

Periostosis signifies a thickening of the periosteum; *hyperostosis*, an increase of the bulk or thickness of bones; *exostosis*, a bony tumour; *osteo-sarcoma*, a degeneration of bone, generally malignant, in which it is converted into a soft mass, with numerous osseous spiculæ radiating through it.

§ 1. *Periostosis.*

A node or periostosis may form on the surface of any bone; on the external surface of the skull, or within the orbit. I have seen

a large venereal node occupying the upper edge of the orbit. Exostosis is often combined with greatly thickened periosteum.

A node is not unfrequently affected with secondary inflammation; it then becomes more swoln, and tender to the touch; it communicates a feeling of fluctuation, and a flow of matter is looked for on dividing it with the knife. Pus is sometimes discharged under such circumstances, while in other cases a reddish serum only escapes by the incision.

Periostosis of the orbit, except when syphilitic, and brought under the influence of mercury, is not likely to be either readily recognised or successfully treated.

Case 58.—Mary Falkner, aged 33, of a florid complexion, married, and who had had three children, the first two alive and healthy, the last a miscarriage at 7 months, applied to Mr Hamilton at the South Eastern Dispensary, Dublin, complaining of great pain in the left eye, and side of the head, with impaired vision. There was a considerable protrusion of the eye; the left eyelids, and especially the upper, was swoln and puffy, so as to fill up the usual depression beneath the eyebrow; they were of a dull red colour, and streaked with veins. The eyeball presented no marks of inflammation, only a few tortuous veins being seen at its upper and inner part. The iris was of a greenish hue; the pupil was natural in size, but not in form, being transversely oval; while at its upper and back part, a bright green spot, of irregular shape and metallic lustre, was very distinct. The pain was most intense, and was referred to the eyeball, but darted also into the head, the whole left side of which was affected; it was worse at night, and deprived the patient of sleep, and was aggravated by the least motion of the body or eye, and by lying on the affected side. There was a distressing feeling of sand in the eye, probably produced by the friction of the tense eyelids over the protruded ball. Sight was much impaired, and on looking down objects were seen double. Muscæ volitantes were constantly before the eye. The patient complained of giddiness. Pulse quick and full. Tongue furred.

Three months before consulting Mr H. she had miscarried, and supposed she had got cold, as the eyes became painful, and the eyelids red and swoln. From that period, the pain gradually increased, and vision diminished.

At first sight, Mr H. was inclined to regard the case as one of incipient fungus hæmatodes; but the woman's healthy appearance, and the circumstance of vision, though impaired, being still retained, led him to doubt the soundness of this opinion. He next suspected the presence of matter, or of some tumour in the orbit, but the most careful examination failed to detect either.

As the symptoms were such as warranted the conclusion that some of the tissues of the eye were inflamed, he resolved to try antiphlogistic treatment. Leeches, cupping, blisters, and active purgatives were resorted to, without the least benefit. Finding the symptoms daily becoming worse, Mr H. asked the advice of another surgeon, who declined giving any decided opinion as to the nature of the disease, pronounced a most unfavourable prognosis, and recommended a trial of small doses of oxymuriate of mercury. As the stomach was now so irritable that this medicine could not be borne, it was given up; and after some little time, the patient was admitted into the Meath hospital.

The prominence of the eye was now so much increased, that it had the appearance of being larger than the other, and the eyelids could not be completely closed. The protrusion was downwards and outwards. The pupil having been dilated by belladonna, it did not return to its natural size, and appeared to be prevented from contracting, by the lens being pushed against it. It had still the same oval form, and its lower edge was turned in. The metal-like spot now appeared much more forward, and seemed to occupy the whole of the pupil, giving it a greenish and rather opaque look, while a small brown waving line, like a blood-vessel, was seen crossing it. The patient had no relief from the pain, night or day. Mitigated for a short time by leeching, it soon returned worse than ever. The stomach became so irritable, that nothing would stay on it. Vision was reduced to a per-

ception of light and shade. The irritability of stomach was allayed by the application of a blister, but the other symptoms became worse, and she left the hospital despairing of relief.

Although different views were taken of the case by the surgeons of the Meath hospital, yet the general impression was that it was malignant. The extent and severity of the deep-seated pain of the head, giving rise to the suspicion of the brain being implicated, seem to have deterred the medical attendants from proposing excision of the eye, an operation to which the patient, from her suffering, would readily have consented.

About a week after she had left the hospital, Mr H. on carefully examining the eye, pressed hard on the orbit, which gave so much pain, that the existence of periostitis instantly struck him. Further examination showed the whole upper and inner part of the orbit, as far as the swoln lid allowed him to ascertain, to be equally tender, leading to the conclusion that the disease extended still farther back. On the supposition of inflammation of the periosteum, and consequent effusion between it and the bone, the pain, swelling, and protrusion of the eye, seemed fully accounted for. The patient now, for the first time, confessed that she had been infected by her husband eight years previously, and had taken mercury, soon after which an eruption had showed itself, and subsequently sore throat. She appeared also to have had iritis, and, for the last four years, had been occasionally troubled with pains in the bones.

The disease being understood, the treatment became obvious. She was put on calomel and opium, with decoction of sarsaparilla. Salivation took place, and by the end of 6 weeks, she had lost all pain, and had regained her health and spirits. The eye had nearly returned into its place in the orbit, the swelling had left the lids, and vision was sensibly improved.

Nine months after the time she first consulted Mr H. there was no difference between the two eyes in appearance; her sight was tolerably good, though still misty; and she had experienced no return of pain.

Mr H. conceives the inflammation, in this case, to have terminated, in an effusion of serous fluid, between the bone and periosteum, which effusion had finally become cartilaginous. Had the disease been a mere thickening of the periosteum, he thinks the protrusion of the ball would scarcely have been so great; had it been a bony swelling, though the pain might have been subdued, the bony mass would have remained, and kept up the exophthalmos, or would have yielded only to a protracted treatment; had it been a purulent deposition, the disease would have run a more rapid course, and the exhibition of mercury have probably proved ineffectual.[1]

Case 59.—Mr Sweatman is mentioned[2] as possessing a remarkable specimen of scirrhous periosteum. A woman, about 70 years of age, in the cancer ward of the Middlesex hospital, had carcinoma of the breast. About a month before she died, one eye was observed to protrude; and 3 days before her death, she suddenly became comatose. Upon examining the skull, it was found that the pericranium, orbital periosteum, and dura mater, on the affected side of the head, were thickened and hard. The dura mater was, at one part, the third of an inch in thickness. The arachnoid adhered to it, and partook in the thickening. The bone was somewhat more vascular than usual, but not otherwise diseased.

§ 2. *Hyperostosis.*

Inflammation of a bone being arrested before the occurrence of disorganization or death of the part, the consequence is sometimes hyperostosis. It is this process which, in some cases, and these generally complicated with atrophy of the brain, slowly thickens the bones of the cranium, without perhaps exciting any suspicion of the existence of such a state, till epilepsy or mania, and ultimately death are produced. The bones of the orbit are liable to the same process; the cavity will thereby be intruded upon; its contents pressed together; and the eyeball pushed forward from its natural place, and at last destroyed.

Hyperostosis is not likely to be affected by any treatment.

We are indebted to Mr Howship for the case of a stout healthy-looking man, 59 years of age, who lost his eyes from hyperostosis of each orbit.

Case 60.—This patient dated the origin of his complaint at a period 14 years before Mr Howship saw him, which was in 1811. He was in perfect health, and on a windy day was walking up Hampstead Hill, when he was suddenly attacked with a violent itching and heat in both his eyes, which induced him to rub them vehemently. Before he could reach home, the irritation had increased to that degree, that he was unable to open his eyes in the light. Inflammation supervened, and a small tumour formed just below the inner angle of each eye, about the size of a hazel nut. These swellings burst inwardly, discharging afterwards freely between the eyelids. The inflammation, treated by fomentations with poppy heads, and other occasional remedies, went on for about 12 weeks. It had then so far subsided, that he could open his eyes, and bear the light tolerably well, so that he went to work again.

About a fortnight after this, having been exposed all night to cold and rain, in the winter season, he had a fresh attack. He applied to Mr Ware, who ordered a warm poultice over each eye, as the swellings were again returning on each side of the upper part of the nose. This treatment was continued for about six weeks, when the abscess at the angle of the right eye burst, evacuating its contents upon the cheek. Two weeks afterwards, that upon the left side broke, and a copious discharge followed. The formation of these abscesses, particularly that upon the left side, was attended with pains in the head, the severity of which he could compare to nothing but the sensation of his head splitting asunder. These pains spread also through the bones of his face. During this attack, he could get no rest day or night for the space of three months. A considerable degree of protection or tumour, apparently osseous, was now observable below the inferior margin of each orbit, and the eyes had become much more prominent than natural. He was at this time a patient in St Bartholomew's Hospital, where his case excited much attention.

One day, one of the pupils observing the right eye to be protruded from the orbit, proceeded to examine it rather hastily, when, as he pressed the tumour, and pushed back at the same time the eyelid, the globe of the eye suddenly sprung out beyond the palpebræ. With some difficulty it was reduced again. At this time he had some power of perceiving light with the right, but more with the left eye. The pains in his head and face continued so severe, that he was frequently almost distracted. The inflammation of the eyes was still violent, particularly that of the left. He was often delirious, and it was sometimes with difficulty he was prevented from tearing his eyes out, in the rage of pain and delirium. At length the right eye burst, from the intensity of the inflammation. The contents of the eyeball having escaped, the excessive inflammation declined, and the patient became somewhat better. The osseous tumours, however, still continued to grow, although their increase was very slow. Although nothing seemed either to have arrested their progress, or much relieved his complaint, he now found his general health much improved.

Some time after this, he was putting down a turn-up bed, and not being able to see what he was about, the bedstead slipped from his hand and fell, one of the feet striking him with great force immediately upon the ball of the eye that was protruded, and lying upon the hard tumour in the cheek. By this accident the globe of the left eye was burst, but he suffered no particular pain at the moment, beyond the mere confusion arising from so severe a blow upon the face. A good deal of inflammation, however, soon came on, but subsided again spontaneously.

Subsequently to this period he usually enjoyed very good health, and in 1815 remained well. He merely observed that whenever he took cold, it was particularly apt to affect his head with a transient return of his old inflammatory pains. On separating the palpebræ, the conjunctivæ still retained strong marks of the severe inflammation they had long suffered. The tumours of the maxillary bones, feeling as hard as ivory, and not in the least painful when pressed, appeared to

occupy very nearly the whole space of each orbit, as well as the cavities of the nostrils, which were almost, if not entirely, obliterated. In the integuments covering the tumours, were several enlarged and varicose veins. From the slow and uniform growth of the swellings, and from the great pain that attended their production, as well as from other circumstances connected with the history, Mr Howship considers that there is every reason to believe that the original affection was the means of exciting a copious secretion of osseous matter, of a more dense texture than is natural to the parts; a change, he observes, which generally results from healthy ossific inflammation.[3]

§ 3. *Exostosis.*

This is a circumscribed tumour, consisting of newly formed osseous matter. A preliminary step in the process by which an exostosis is formed, is the deposition of cartilage. Exostosis within the orbit has been met with, wholly in the cartilaginous state; in other cases, the tumour is partly cartilaginous, partly osseous. The cartilaginous deposition gradually undergoes the change which converts it into bone. Three varieties of exostosis have been distinguished; the *cellular*, the *craggy*, and the *ivory;* the first presenting an external crust, within which are numerous bony partitions, together with a quantity of soft substance, and occasionally hydatids; the second consisting of a mixture of osseous laminæ with cartilage, but without any shell; the third white and dense like ivory. In the last, and partly in the first, the deposit consists of pretty perfect bone; but in the craggy exostosis, the matter deposited is a sort of false bone, a caky lump of phosphate of lime, not perfectly organized. The cellular exostosis appears to be one of the diseases comprehended under the old name *spina ventosa.*

Symptoms. Exostosis springs in some cases from the edge of the orbit; its nature is recognised by the touch; and as it grows, it comes in part to cover and confine the eye. Although, in general, the touch will serve to discriminate between exostosis in this situation, and any other kind of growth, I may mention that I have seen a case of scirrhous tumour attached to the edge of the orbit, and partly within its cavity, so very firm in its consistence, and unyielding in its attachment, as to have been taken for an exostosis, previously to dividing the skin for its extirpation.

Exostosis from the edge of the orbit is sometimes combined with encysted tumour, of which I had an instance at the Glasgow Eye Infirmary, in a middle-aged female. The encysted tumour had existed from infancy, and was attended with exostosis from the edge of the frontal bone, preventing the patient from raising the upper lid. After a gentle mercurial course, the exostosis diminished so much as to permit the lid freely to exercise its functions. The case was probably in part syphilitic, as the patient afterwards presented herself with a suspicious-looking sore on the arm, which healed under the use of mercury.

Exostosis may spring from any side of the orbit. We might perhaps suppose it more likely to grow from the floor or from the temporal wall of that cavity, than from the thin bones which form its roof and nasal side; but this does not appear to be the case. The

most remarkable symptoms produced by an exostosis within the orbit are the following :—

1. *Exophthalmos or protrusion of the eyeball.* This is one of the earliest symptoms of any kind of growth within the orbit. Sometimes the eye is projected directly forwards, even when the osseous tumour is afterwards found to arise not from the bottom of the orbit, but from one or other of its sides. More frequently the eyeball is pushed forwards and to one side, towards the nose or temple, upwards, or downwards, according to the side of the orbit giving rise to the exostosis. If the case is left to itself, the protruded eye sometimes inflames and bursts.[4]

2. *Pain.* This is very variable; nor is it easy to explain how some suffer so severely, even from a small exostosis within the orbit, while others from large tumours of this sort suffer but little. The pain is communicated through the 5th nerve, and is sometimes felt in the eyeball, sometimes deep in the orbit, sometimes in the temple.

3. *Amaurosis.* The protrusion of the eye must be attended with dragging of the optic nerve; and this, along with the pressure caused by the tumour, induces dimness of sight, and at length blindness. Amaurosis is sometimes the earliest symptom.

4. *Change of form.* Exostosis sometimes increases to such a size as considerably to disfigure and intrude upon the orbit. Sometimes it advances so as to be felt between the edge of the orbit and the eyeball. It may intrude upon the nostrils, upon the opposite orbit, or even upon the cavity of the cranium, and thus prove fatal.

Diagnosis. In cases of exostosis within the orbit, it is often impossible to decide regarding the nature of the disease, before proceeding to operate, or before the death of the patient; for exophthalmos, pain, amaurosis, and deformity of the orbit, are found to arise from several other diseased states of the parts besides an osseous growth, as encysted and other tumours, fungus of the maxillary sinus, &c. In advanced cases of fungus of the maxillary sinus, other symptoms, no doubt, attend those already enumerated, as softening of the palate, distention of the cheek, and obstruction of the nostril, which may serve to distinguish such cases from any disease confined to the cavity of the orbit. But between an encysted tumour, not yet advanced so as to press upon the eyelids, and a deep-seated exostosis, it is often totally impossible to discriminate. The eyeball is merely extremely prominent, and the patient deprived of the sight of that eye, without any tumour being felt, or any other diagnostic symptom being present. Neither can we pretend to decide in cases of this dubious kind, whether thickening merely of the periosteum, thickening of the bones, or such a tumour as we call exostosis, be the cause of the exophthalmos.

Prognosis. Cellular exostoses are said to be occasionally destroyed by suppuration and caries; any such change can scarcely be expected to take place in the craggy, and much less in the ivory exostoses. Nor will the possibility of any exostosis being destroyed by inflammation, ever withhold us from removing such tumour by operation; for its spontaneous destruction must be uncertain and tedious. The

ivory exostosis is much slower in its progress than the others, and sometimes it entirely ceases enlarging.

Causes. Besides venereal and scrofulous constitutional disease, blows and other injuries have been known to give rise to exostosis.

Treatment. This must consist in anti-venereal and anti-scrofulous remedies; and, in certain cases, an attempt should be made to remove or destroy exostosis of the orbit by operation.

Leeches round the orbit; friction with mercurial ointment, or with a mixture of 10 parts of muriate of ammonia to 100 parts of blue ointment; and mercury internally, are worthy of trial, especially if a syphilitic taint is supposed to be the cause of the disease. Local depletion, change of air, mild alteratives, iodine, and tonics of different kinds, may be tried in scrofulous cases. Should these means fail, and the disease be so situated that it can be reached, the attending symptoms may demand, that we should either attempt excision of the morbid growth, or endeavour to produce in it an artificial necrosis.

The tumour being exposed by an incision through the integuments, and between the fibres of the orbicularis palpebrarum, it may sometimes be removed with a strong scalpel, a small chisel, or a slender bone forceps, similar to that used by Mr Liston for the excision of diseased pieces of bone. If it is connected by a kind of pedicle, it will be more easily removed in this way; with much more difficulty, if it grows by a broad basis. In some cases, the entire exostosis may be separated; in other cases, portions of it merely. It may sometimes happen that it shall be broken into pieces, yet none of these can be got away without severely lacerating the soft parts. In this case, they must be left. Suppuration will take place round them, and then they will come away. The operation must of course be executed very cautiously, lest the thin bones of the orbit be fractured, or any injury done to the eyeball or its nerves, in the attempts to detach the exostosis.

In cases where it is not possible immediately to detach an extosis from the bone whence it grows, it has been proposed to divest the tumour as much as possible of its periosteal covering, and then leave the new growth, thus deprived of its nourishment, to perish by exfoliation. After stripping the tumour of its periosteum, it may be rasped with a file, or rubbed with caustic, so as to render its destruction still more probable. In consequence of this, a scale will drop off, or perhaps the whole exostosis may separate; for unhealthy structures die more readily than healthy. Cases are recorded, in which, after the application of caustic to an exostosis of the orbit, the tumour has in this way mortified, and been thrown off. Yet we must regard this as a practice to be followed, only when immediate detachment of the diseased growth appears impracticable. It is a mode of cure attended with much more pain, and is much less manageable than the use of the chisel or forceps.

Orbital exostoses have sometimes been removed while in the cartilaginous state, lying under the periosteum. Mr Travers men-

ions that he had seen several cases of this description; the tumour presenting at the nasal side and appearing to extend to the bottom of the orbit, its anterior edge thin and bound down by the orbital circumference. From its compressing the eye to blindness and pushing it out of the orbit, he inferred that the tumour probably possessed considerable bulk. He once removed, he tells us, a tumour of this kind, on the nasal side of the orbit, scraping it clean away from the bone. It was of the hardness of cartilage, and of great extent. He is unable to say whether the disease returned, having lost sight of the patient soon after the operation. The impression he had of the case was unfavourable, from the character as well as the extent and connexions of the tumour.[5]

Under certain circumstances, it may be advisable to remove the protruded eyeball in cases of exostosis of the orbit; namely, when vision is destroyed, the pain distressing, and the osseous tumour probably so far back in the orbit, that it could not be extirpated. The removal of the protruded eyeball has also sometimes been resorted to, in cases of exostosis of the orbit, when the symptoms were too obscure to lead to any decided diagnosis.

Cases. The cases of exostosis of the orbit, minutely related, are not very numerous. I shall quote the most remarkable, as each will serve to illustrate one or more points of importance.

Case 61.—*Exostosis of the orbit, consequent to an injury, removed by operation.* A girl, about 17 years of age, received a blow with a rake, the handle of which entered the left orbit. She immediately fell down insensible, but soon recovered her senses, and on examination a deep wound was found between the upper wall of the orbit and the eye, the upper eyelid having been lacerated. There was not much bleeding. The eyelid did not become affected, and remained free from inflammation during the healing of the wound, which took place in a short time, and without any particular treatment. About 18 months after the accident, the girl felt a tumour forming behind the upper eyelid, but as it was not accompanied by pain, or any other inconvenience, she did nothing for it till it had acquired a large size. At the time when Dr Salzer saw her, four years had elapsed from the occurrence of the accident. The tumour, by this time, was very hard, immoveable, and protruding from the orbit, but still completely covered by the eyelid; the globe of the eye was forcibly pushed aside, and downwards, so as almost to touch the left nostril; sight was not completely destroyed.

The upper eyelid was divided, and the tumour, having been laid bare in its whole breadth, was found of osseous texture, and attached to the orbit, not (as was anticipated) by a pedicle, but by a broad base. The substance of the morbid growth was so dense, that it was necessary to attack it with the chisel and hammer, and even in this way only portions of it could be removed. Towards the end of the operation, which lasted several hours, it appeared that a large piece of bone was loose; but this could not be extracted, though several attempts were made to do so. The patient was bled and had ice applied over the forehead; she complained of violent pain, apparently from the pressure which the loose pieces of bone exerted on the eye, for as soon as by a proper apparatus this pressure was lessened, the pain and inflammatory symptoms subsided. The osseous fragment, and what remained of the exostosis, having been subsequently removed by the application of the trephine, the muscles and vessels of the eye were found so much flattened, as almost to resemble ligaments; however, after some time the globe began gradually to reascend into the orbit, and in six weeks after the operation recovered its natural position. The sight had not suffered at all. The quantity of bone removed weighed about 2 ounces, after having been dried.[6]

Case 62.—*Exostosis of the orbit destroyed by inflammation excited by the use*

of caustic. Brassant's case is often referred to. The patient was a woman, 30 years of age, who had fruitlessly undergone the operation for fistula lacrymalis. Fifteen years afterwards, the os planum and the internal angular process of the frontal bone presented an exostosis of the size of an egg. The globe of the eye, compressed laterally, was thrust out of the orbit, and hung in some measure on the cheek at the temporal angle. Brassant attacked this exostosis with caustic. It suppurated, and within the space of from three to four months, exfoliation of a considerable portion of the bony growth took place. The eye returned to its natural situation, and the cure was ultimately perfect.[7]

Case 63.—*Exostosis exfoliates after repeated operations.* Professor Spöring has recorded a case of osseous excresence, which grew from the bone in the immediate vicinity of the internal canthus. The patient was a man of 35 years of age. The excrescence grew to the size of a very large walnut, pushing the eye nearly out of its socket, and impairing vision. A surgeon tried to remove it, by promoting exfoliation ; but the wound bled so freely, that he was happy to close it up again. Sometime afterwards, a peasant was allowed to try his skill upon it. He began with an incision round the bone, which caused a great effusion of blood. He afterwards applied to it some secret remedy, which produced intolerable pain for 12 days, attended with faintings. Several months afterwards, however, the patient had the courage to undergo the operation again. In the following spring, the entire exostosis dropped out ; the eye returned to its situation in the orbit, and vision was restored.[8]

Case 64.—*Exostosis of the orbit not discovered till after extirpation of the protruded eye-ball.* Mrs Craig, aged 24, was admitted into the Glasgow Royal Infirmary, 5th January 1828 ; at which time the right eyeball was so much protruded as to be almost out of the orbit. As I had occasion to see this patient before she went to the Royal Infirmary, I may mention that the protrusion was directly forwards, so that, though the idea of the exophthalmos probably depending on exostosis of the orbit, naturally occurred to my mind, I could not have been led to assign any one of the sides of that cavity as more likely than another to be the seat of such a growth. Ectropium and chemosis attended the protrusion. The cornea was ulcerated and muddy ; the pupil dilated and immoveable, and vision lost. The patient had constant severe pain in the bones of the orbit, and right side of the head, rendered more acute by pressure. She had rheumatic pain of the knees. Her health was greatly impaired, but had improved since she gave birth to a child, eight weeks before her admission. The vision of the eye had been dim for 18 months, and completely lost for four. The pain of the head was of 12 months' standing, and the prominence of the eye of eight weeks'. She had had some discharge of yellow fluid from the right ear, about the time when the sight was lost, but not afterwards. Her mouth was affected by pills which she had taken for five or six weeks.

Dr Anderson, under whose care she came on her admission into the Infirmary, suspected syphilis, but she denied it ; and as the mercury seemed to have had little other effect than that of increasing debility, he suspended its use, and endeavoured to procure relief from other medicines and external applications, chiefly opiates and narcotics. These did not succeed. He then evacuated the humours of the eye, but this also was ineffectual. He next extirpated the eye with the knife, after which, a tumour about the size of a hazel-nut was discovered on the floor of the orbit, solid, nodulated, and bony. The pressure of this exostosis had been the cause of the pain and protrusion, but as it was firmly fixed, and could not now exert any injurious pressure, it was not considered prudent to attempt its removal. From some inflammation and fulness in the right nostril, Dr Anderson had been led to suppose it likely that there might be a fungous or other tumour pushing upwards from the antrum to the orbit. The relief from pain was remarkable after the extirpation of the eye. Plummer's pill, and a decoction of sarsaparilla, were now used for several weeks, during which time the patient got almost quite well ; but whether this proceeded from the removal of the eye, the discharge which succeeded it, or the medicine, Dr Anderson does not decide. He believes that all of these were useful. It was his intention to advise the insertion of a pea issue in the neck, and a continuance of the medicine, but the patient left the Infirmary on the 1st of March, without receiving these instructions. At that

ime, her health was good, and there was no appearance of increased growth in he orbit.[9]

Case 65.—*Exostosis filling the orbit.* Dr Baillie, in his series of engravings llustrative of Morbid Anatomy, has given a figure of a preparation of exostosis f the orbit belonging to Mr Hunter's museum. The figure shows an inner view f a section of the fore part of the cranium. The section had been made at such level, as to include a small part of each orbit. A tumour is represented ccupying the left orbit, which it has considerably dilated, and shooting for some ay across into the other orbit, and backwards into the cavity of the cranium. Dr Baillie mentions that the tumour was nodulated, and represented a compactess of texture exactly like that of ivory. Unfortunately no history of the case

A The inner surface of the anterior part of the cranium.
B The right orbit.
C The exostosis, resembling ivory, filling the left orbit.

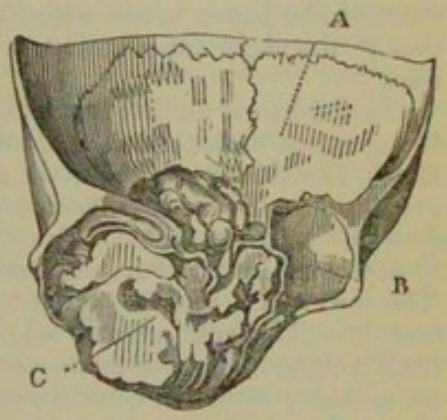

Fig. 8.

ppears to have been preserved. It bears a certain degree of resemblance to the emarkable case of hyperostosis of the orbits already quoted (page 45) from Mr lowship. Dr Baillie has hazarded a conjecture regarding it, for which, I should ink, there is scarcely any foundation, namely, that perhaps this tumour consisted of the eye converted into bone.[10]

The basis of the orbit has been found to be occasionally the seat f exostoses. Sometimes one portion of it, and sometimes another as been affected; but the superior maxillary bone most frequently. Cases of this sort have been described as exostoses of the maxillary inus. In one case on record, an ivory exostosis formed between he nostril and the orbit; in another case, the whole basis of the rbit seems to have been affected.

Exostosis of the walls of the maxillary sinus appears to be by no neans a very rare disease, and will require considerable attention o distinguish it from the affections of the sinus to be described in he next section. It sometimes reaches a great size; but to whatver size it may grow, its most prominent point never softens, which onstitutes an important diagnostic mark, by which exostosis of the naxillary sinus may be distinguished from polypus, and even from steo-sarcoma.

Case 66.—*Exostosis of the facial bones shutting up the orbits.* Jourdain has elated and figured a remarkable case of exostosis of the bones of the skull, and specially of those of the face. The patient was the son of a surgeon at Perpignan. t the age of 12 years, he was affected with a lacrymal tumour at the inner angle f the right eye, which his father opened, and which suppurated for a pretty long me. When the tumour was opened, an eminence was observed growing from ie middle of the nasal process of the upper maxillary bone, about the size of a nall almond. It resisted different local applications, and grew insensibly, so iat in a short time it was a considerable tumour. By the time that the patient as 15, his two upper maxillary bones were equal, and presented two eminences

so considerable, that they served to bury between them the cartilages of the nose, and so compressed the nostrils, that the patient could breathe only by the mouth. His school-fellows could not endure the deformity of his face; yet they loved him for his wit and talents. Every thing was done by his father which was likely to remove the disease; but all was ineffectual. At the age of 20, his appearance was monstrous, so that his friends dissuaded him from thinking of the priesthood, to which he had intended to attach himself. His lower jaw was also affected with an enlargement, which augmented more and more. Although his appearance was such as to oblige those who met him to turn away from looking at him, he was very inquisitive, an . would visit every thing which excited attention. He ate and drank well, till having reached his 44th year, he was attacked with fever; during his convalescence from which he became blind. As he recovered strength, he began to see with his left eye, and to go about alone; but inflammation of the chest supervening, with suppuration, and bloody expectoration, he died.

On dissection, the left lung was found almost destroyed by suppuration. With the greatest attention, it was impossible to discover any of the muscles of the face. The skin was glued to the periosteum. The cranium and face were entirely exostosed. The malar and superior maxillary bones especially appear, from Jourdain's figure, to have given rise to a large exostosis on each side projecting so as to meet each other, and covering the nose, and in a great measure the orbits. The lower jaw also is exceedingly enlarged. The exostoses were as hard as marble. The cranium and face weighed 5 French pounds; the lower jaw by itself weighed 3 pounds 3 ounces; the whole together 8 pounds 3 ounces; whereas, an ordinary adult skull, including the lower jaw, weighs generally about 1 pound 9 ounces, or at most 1 pound and 3 quarters, so that taking the pound at 16 ounces, the exostoses had augmented the weight of the head 6 pounds 7 ounces. This patient had never complained of pain in his head nor in his lower jaw.[11]

Case 67.—*Orbit obliterated by a maxillary exostosis.* I recollect noticing a very remarkable skull, in the museum of the *Ecole de Médecine* at Paris, to which collection it was presented by Professor Sue. It has been described[12] as an example of osteo-sarcoma, but I think there can be scarcely any doubt of its being an exostosis of the walls of the maxillary sinus. The osseous tumour, which is actually not much less than an ordinary cranium, is smooth and polished externally, very thin at its upper part, hard and covered with bosses posteriorly, and interiorly filled with osseous cysts. It springs from the right maxillary sinus and lower part of the frontal bone, and extends from the right mastoid process towards the left maxillary bone. No trace is to be seen of the right orbit; the right nostril is entirely obliterated; as well as a portion of the left orbit. The tumour proceeds downwards and forwards from its origin, to a level with the basis of the lower jaw, measuring from the mastoid process 12 inches in length, and in circumference 16 inches.

Case 68.—*Maxillary exostosis cured by mercury.* Boyer relates the case of a man, who for more than 10 years had an exostosis of the left maxillary sinus. The eye on that side was affected with stillicidium lacrymarum. The eyeball was pushed forward, the nose twisted to the right, the nostril closed, and the palate somewhat swoln. The tumour was very prominent upwards and outwards, and the skin covering it red and shining. The visage was excessively deformed. The exostosis had appeared soon after a venereal infection, which had been followed by secondary symptoms. It had increased slowly; but for several years had made no progress. Painful at first, it had ceased to be so when it became stationary. The patient, of his own accord, resolved to try fully the effect of the liquor of Van Swieten; and after having taken, without any medical advice, and in less than three months, 128 grains of corrosive sublimate, he was entirely freed of the exostosis. The eye returned into the orbit, the stillicidium ceased, and the nostril became free. A depression on the cheek, and an adhesion of the skin, marked what had been the situation of the tumour.[13]

Case 69.—*Maxillary exostosis passing through the orbit into the cavity of the cranium.* In the collection at St Thomas's Hospital, London, there is the skull of a fish-woman, who had long been remarkable, even at Billingsgate, for

her hideous appearance. Two large swellings had been formed under the orbits n the forepart of the cheeks, between which the nose appeared wedged, and the nostrils were closed. Each eye projected considerably from its socket. This person was seized with a fit, which seemed to be of an apoplectic nature, and in that state was brought to St Thomas's Hospital, where she died almost immediately. Upon examination of the head, an exostosis was found growing from each antrum, and forming the large swellings upon the cheeks. The exostoses projected also to the orbits, so as to occasion the protrusion of the eyes. On the left side, the exostoses entered the cranium, projecting inwards through the orbitary process of the os frontis, and occasioning such pressure on the brain, as, under a considerable excitement of the vessels of that organ, produced apoplexy, which proved fatal.[14]

Case 70.—*Maxillary exostosis removed by operation.* An Irish labourer aged 24, admitted into Guy's Hospital, 1st August 1835, stated that when 15 years of age, he perceived a small tumour in the right nostril, which had since that period gradually increased. At his admission, the tumour occupied the whole right side of the face. The right nostril was enormously expanded, and was filled up by the growth, which was so large as completely to conceal the eye on that side. The tumour extended downwards into the mouth, being there connected with the palatine and alveolar processes of the right superior maxillary bone, and projected forwards, so as to press the lip beyond the teeth, to the extent of 2 inches.

The surface of the tumour was irregular. Its most prominent parts were situated under the right orbit and opposite to the ala nasi. They were slightly discoloured by inflammation; but the reddened surface of those projections indicated no approach whatever to the change in the vascular system, which evinces the existence of malignant disease. The patient complained of no pain; nor had he suffered much during the course of the disease. His general health appeared good; but he was greatly emaciated, more from want of food than from the constitutional effects of his disorder.

Mr Morgan found the tumour almost uniformly firm, and of a bony hardness, even at its most prominent point. He was therefore led to conclude that it consisted in a morbid deposit of bone. He knew of no cases of malignant disease of bones, where the enlargement had proceeded to the same extent, and the disease existed for so long a time, in which the shell of the excrescence retained the character of bone. There was no softening of the prominent point of the tumour in this case; and he therefore concluded that it was one of common exostosis.

Desirous of being certain of the nature of the disease, he made a crucial incision, between the most prominent points, over the right nostril, and, by means of a trephine, removed a portion of the tumour, which proved to be true exostosis. A semilunar incision was then made, extending over the nostril, from the internal angle of the right eye to the centre of the upper lip. A similar incision was made on the outer side, commencing at the external angle of the eye, and joining the former at the lip. The integuments were then dissected from around the tumour, and with a metacarpal saw it was removed. As it was of a spongy texture, it offered little resistance to that instrument. No great quantity of blood was lost during the operation, the exostosis not being very vascular. The integuments were brought together by the uninterrupted suture.

A section of the tumour proved that it was composed of an outer hard thin shell of bone, enclosing a mass of spongy cancellated structure, devoid of all appearance of carcinomatous or fungoid disease.

The wound suppurated. The tumour in the mouth gradually decreased. Hardly any exfoliation took place. The patient's general health was speedily restored.[15]

Case. 71.—*Exostosis between nostril and orbit, removed by spontaneous separation.* When Thomas Moore was about 13 years of age, a little pimple, like a wart, appeared under his left eye, close to his nose. He scratched off the head of his pimple, which formed a scab. This was followed by a tumour, which grew for 23 years. The tumour, although slow in its progress and free from pain, gradually became more conspicuous, and at last produced great disfigurement of the face.

The turbinated and cellular apparatus on the left side of the nose were destroyed; the septum nasi was pushed towards the right side, so as nearly to obliterate the right nostil; and the left orbit was thrust outwards.

After a time, the tumour displaced the inner wall of the orbit; and the globe of the eye, being thus subjected to pressure, became the seat of most excruciating pain, though vision was very little impaired. When the patient was about the age of 19, the eye, yielding to the pressure, burst, and discharged its fluid contents. In less than an hour after this took place, the patient, who had been deprived of rest during several weeks, was buried in profound sleep. He awoke nearly free from pain; and this comparative ease continued.

When he had reached the age of 30, the tumour was observed to be somewhat loosened, and to be becoming detached by ulceration of the surrounding soft parts. The process of detachment was alleviated by copious suppuration, and occasionally by profuse hæmorrhagy from the vessels of the adjacent structures. For a time, the tumour was retained merely by bands of integument, which it would have been easy to divide. At length, several small irregular portions of bone came away; but the large mass continued to be maintained in its situation until the transverse bands were divided by ulceration, when to the patient's astonishment, the whole tumour fell from his face. Neither pain nor bleeding attended this separation; but a large chasm was left, between the nose and the orbit, bounded below by the nasal surface of the hard palate, and the floor of the left antrum, above by the left frontal sinus and left half of the cribriform plate of the ethmoid bone, internally by the septum nasi, which presented a concave surface, with a small opening through its lower part, communicating with the right nostril, and externally by the left orbit. Posteriorly, the chasm opened into the pharynx.

When Mr Hilton drew up his account of the case, the roof, the outer wall, and part of the inner wall were covered with granulations. On comparing the distances from the median line of the face to the malar edge of each orbit, that on the left side was found to be nearly an inch greater than that on the right. The left eyebrow was elongated in the same direction for about half an inch; and the cerebral cavity appeared to be encroached upon by the pressure of the tumour upwards.

The tumour weighed $14\frac{3}{4}$ oz. Its specific gravity was 1.80. Its greatest circumference measured rather more than 11 inches, and its least 9 inches. Externally it was undulated, and its posterior surface concave. A section of it presented a very hard surface resembling that of ivory, with lines, to the number of 50, arranged in concentric curves, enlarging as they proceeded from the posterior part of the tumour. Dr Hodgkin regarded it as referrible to the type of compound serous cysts.[16]

Case 72.—*Cup-like exostosis of the edge of the orbit.* Acrel relates a case of this sort under the title of *spina ventosa* of the right orbit. The bones forming that cavity, especially the frontal and superior maxillary, were so much protruded, as to present the appearance of a blunt cone, 4 fingers' breadth high, and about the same in diameter at its basis. He compares it to a small cup inverted, in the bottom of which, or end which was turned outwards, was the eye. This was not completely sound and clear, and was smaller than the left eye; it had eyelids, which were moveable, and the other parts belonging to it, and even served to distinguish large objects pretty well. Acrel considered the case incurable. He mentions that he had seen another case of the same sort, for which also he regarded it useless to attempt any operation.[17]

§ 4. *Osteo-sarcoma.*

Osteo-sarcoma, by some called *fibrous exostosis*, and by Sir Astley P. Cooper *fungous exostosis of the medullary membrane*, sometimes attacks the skull, and involves the bones of the orbit.

The disease consists in the development of a fleshy tumour, involving the substance of a bone; taking its rise sometimes from the surface, but more frequently within the spongy tissue of the bone

affected. The tumour generally consists of a substance much softer than ordinary cartilage, containing numerous slender spiculæ, or thin osseous plates, radiating through it, being partly the original bone expanded and separated into fibres, and partly new unhealthy bone. This disease depends on a particular state of constitution, and is generally regarded as malignant. Mr Lawrence, however, distinguishes[18] indolent from malignant osteo-sarcoma; the former occupying years before it attains a very considerable size, attended with little pain, and dangerous, only in consequence of interfering with the functions of other parts, from the magnitude it attains; the latter attended with pain from the first, and growing very rapidly. This is the same distinction, which is made by other surgical authors, of fibro-cartilaginous from sarcomato-medullary exostosis. The latter, or malignant osteo-sarcoma, seems to be fungus hæmatodes occurring in bone.

In Dr Hunter's Museum, in the University of Glasgow, two skulls are preserved, which have suffered greatly from osteo-sarcoma. One of them, apparently a male skull, of which no account is preserved, exhibits the whole left side changed by the disease in a most remarkable degree, the spiculæ and laminæ of bone into which it is converted rising at least $\frac{3}{4}$ths of an inch above the natural level of the bones. The spiculæ project also towards the interior of the cranium, especially from the temporal bone. Only a small part of the floor of the orbit remains unaffected, the three other sides being in a great measure destroyed. The other skull, a female one, is figured by Dr Baillie, in his Series of Engravings Illustrative of Morbid Anatomy.[19] Nine or ten different parts of the cranium are affected in this instance. The middle of the os frontis, the right temporal bone, both parietals, and the frontal behind its right external angular process, are the principal situations of the disease. At the right temple, the disease penetrates into the orbit, and affects in a slight degree the interior of the cranium. In each parietal region, the inside of the skull is much affected, spiculæ of half an inch in length projecting inwards in these situations. In each specimen, the morbid appearances are evidently the effects of a disease springing up in the cancelli, and destroying both tables of the skull.

Case 73.—Sir Astley P. Cooper[20] has given a sketch of an osteo-sarcomatous tumour on the forehead, extending close to the edge of the orbit. Sir Astley persuaded the subject of this tumour to submit to an operation. On removal, it was found exactly of the character above mentioned, and although partly formed of osseous spiculæ, was readily broken down with the finger. The patient became feverish and comatose, and died on the 6th day.

On dissection, Sir Astley found that the swelling occupied the internal as well as the external table of the skull, that it extended through both, and affected the dura mater, which had several fungous projections proceeding from it, and that the inflammation excited by the operation, had extended to the membranes of the brain. The complaint seemed to have originated in the diploe of the os frontis, and to have produced an effusion both between the pericranium and the skull, and between the skull and the dura mater. The swelling, upon the outer part of the head, was, however, much larger than that which had arisen from the inner table. It was evident, too, that this case must have proved fatal, although no operation had been performed.

Sir Astley concludes this case by observing, than an exostosis on the external table of the skull, growing slowly, very little vascular, unattended with any considerable pain, may safely be made the subject of an operation; but that a swelling of more rapid growth, red upon its surface, showing signs of considerable vascularity, and attended with great pain shooting through the brain, is one for which he should hesitate again to perform an operation.

These latter characters belong not to simple exostosis, but to osteo-sarcoma.

Case 74.—Sir Philip Crampton was consulted by a lady of about 55 years of age, on account of dimness of sight affecting the right eye; the eye felt exceedingly hard to the touch, was affected with strabismus, and projected in some degree from the orbit; the pupil was immoveable, but vision was not altogether destroyed. She complained of severe shooting pains in the head and in the right arm; her general health was much affected, and her aspect almost cadaverous; her memory seemed much impaired, and there was a general insensibility to external impressions; she was depressed in her spirits, yet she made but little complaint. On an attentive examination it was plain that there was some fulness in the situation of the temporal fossa, but the tumour was perfectly indolent and incompressible.

Sir Philip did not see the lady again for four or five weeks, when he found her nearly comatose; the swelling on the temple had increased to a considerable degree, and the eye was still farther protruded from the orbit. She expired in a few days, and on the day following her death, the head was examined.

On raising the aponeurosis of the temporal muscle, the temporal fossa was found to be occupied by a greyish-coloured substance, of the consistence of brain; the muscle itself had completely disappeared; numerous osseous spiculæ proceeding from the frontal and temporal bones, passed into the tumour, of which they constituted a considerable part. On opening the head, a tumour of precisely the same description, beset in the same manner by bony spiculæ, was found lodged between the dura mater and the internal orbital process of the frontal bone.

On macerating the bone, it exhibited the most perfect specimen Sir Philip had seen of *fibrous exostosis*. The spiculæ proceeding both from the outer and from the inner table of the cranium were each about as thick as a hog's bristle, and ¾ths of an inch in length; they were set as closely together as the hairs of a brush, and extended in an undulating line over a space of about 2 square inches in extent. The tables of the skull were slightly separated from each other in the part corresponding to the exostosis, and the diploe seemed to contain some of the same brain-like matter which formed the bulk of the tumour.

Sir Philip thinks it impossible to decide whether the disease commenced in the soft parts, or in the bone; although it seemed probable that it commenced in the bone, because the spiculæ were furnished by the bone itself, and not by the periosteum or dura mater, which were separated by the tumour to the distance of nearly an inch from the outer and inner tables of the skull respectively.

Sir Philip observes that, in malignant osteo-sarcoma, it is more usual to find a deficiency than an excess of bony matter, for although spiculæ of bone are interspersed through the brain-like substance which forms the bulk of the tumour, the bone itself is usually divested of its earthy basis, and is converted into a steatomatous or cartilaginous substance. Sometimes, however, the tendency to secrete phosphate of lime is surprisingly increased, and then large and singularly-shaped masses of bony matter are thrown out from the surface of the diseased bone. The presence or absence of bony matter in an osteo-sarcomatous tumour will probably depend, Sir Philip thinks, on the relative activity of the secreting and absorbing systems in the diseased bone. He is also of opinion, that the varieties

which are met with in the character and nature of osseous tumours, depend greatly on the kind of constitution of the patient, whether that be healthy, cachectic, or scrofulous.[21]

It is scarcely necessary to add, that in cases of osteo-sarcoma of the orbit, the less that is done the better.[22]

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[1] Dublin Journal of Medical Science; Vol. ix. p. 255; Dublin, 1836.

[2] London Medical Gazette; Vol. xv. p. 265; London, 1835.

[3] Howship's Practical Observations on Surgery and Morbid Anatomy, p. 26; London, 1816.

[4] Exophthalmos is a symptom rather than a disease; but as it is often the only symptom, arising from an unknown cause, it is not unfrequently spoken of, as if it were an independent disease. The following are some of the causes of exophthalmos: periostosis and exostosis of the orbit, fungus of dura mater making its way into the orbit, fungus from the maxillary sinus making its way into the orbit, diseases of the lacrymal gland, inflammation or infiltration of the orbital cellular membrane, orbital tumours or aneurisms, fungus hæmatodes within the optic sheath, phlegmonous ophthalmitis. If the eyeball inflames violently in the protruded state, the term exophthalmia is substituted for exophthalmos.

[5] Travers' Synopsis of the Diseases of the Eye, p. 227; London, 1820.

[6] Quoted from the Neue Zeitschrift für Natur- und Heilkunde, in the Lancet for 1831; Vol. i. p. 671.

[7] Mémoires de l'Académie Royale de Chirurgie; Tom. xiii. p. 277; 12mo; Paris, 1774.

[8] Quoted from Haller by Mr B. Bell, in his Treatise on the Diseases of the Bones; p. 121; Edin. 1828. Referred to also by Acrel. I have not been able to find the original account of the case.

[9] Glasgow Medical Journal; Vol. i. p. 319; Glasgow, 1828. After Mrs Craig's return home to Paisley, Dr Anderson was informed that she died from the exostosis affecting the brain, probably by pressure.

[10] Baillie's Series of Engravings, Fasciculus x. Plate 1. Also his Morbid Anatomy, p. 446; London, 1812.

[11] Jourdain, Traité des Maladies de la Bouche; Tome i. p. 289; Paris, 1778.

[12] Dictionaire des Sciences Médicales; Tome xxxv. p. 25; Paris, 1819. See description and figures of another skull, affected with exostosis of the maxillary sinus, by Bordenave, in the Mémoires de l'Académie Royale de Chirurgie; Vol. xiii. p. 412; 12mo; Paris, 1774.

[13] Boyer, Traité des Maladies Chirurgicales; Tome vi. p. 168; Paris, 1818.

[14] Surgical Essays, by Cooper and Travers; Vol. i. p. 169; London, 1818.

[15] Guy's Hospital Reports; Vol. i. p. 403; London, 1836.

[16] Ibid. p. 493.

[17] Acrel, Chirurgische Vorfälle, übersetzt von Murray; Vol. i. p. 102; Göttingen, 1777.

[18] Lectures on Surgery, Medical Gazette; Vol. vi. p. 454; London, 1830.

[19] Fasciculus x. Plate 1; London, 1799.

[20] Op. Cit. p. 212.

[21] Dublin Hospital Reports, Vol. iv. p. 554; Dublin, 1827.

[22] The reader will find a remarkable case of degeneration of the bones of the cranium and face, involving the orbit, related and figured by Cruveilhier, in his Anatomie Pathologique; Tome i. Livraison 21. He considered the affection as cancerous.

SECTION IV.—DILATATION, DEFORMATION, AND ABSORPTION OF THE ORBIT, FROM PRESSURE.

When an abscess or a tumour forms within any of the osseous

cavities of the body, pressure slowly dilates even the bones, thins them, softens them, and forces them to give way. The bones of the cranium are not exempt from these changes, and have been known to allow a tumour of the brain to protrude externally. Dr Donald Munro has related a case of this kind, in which a tumour of the brain protruded through the os frontis;[1] and Mr Hunter has noticed a case in terms so exactly similar, that it is likely it was the very same which was seen by Dr Munro. Mr Hunter thinks that the tumour had probably formed in the pia mater. It was oblong, above an inch thick, and two or more inches long. It was sunk nearly its whole length into the brain, seemingly by the simple effects of pressure, but the outer end of it, by pressing against the dura mater had produced the entire absorption of this membrane at the part pressed upon. The same irritation had been communicated to the skull, which was also absorbed; after which, the same disposition was continued on to the scalp. As these respective parts gave way, the tumour was pushed farther and farther out, so that its outer end came to be in the passage which the absorbents were making for it in the scalp, by which it probably would have been discharged in time, if the man had lived; but it was so connected with the vital parts, that the man died before the parts could relieve themselves. While all these exterior parts were undergoing absorption, the internal parts which pressed upon the inner end of the tumour, and which pressure was sufficient to push it out, did not in the least ulcerate, nor did the tumour itself, which was pressed upon on all sides, in the least give way in its substance. No matter was to be observed; neither from the dura mater, the edge of the bones of the skull, nor that part of the scalp which had given way. The general effect, however, was similar to the progress of an abscess, insomuch that it was on the side nearest to the external surface of the body that the irritation for absorption had taken place.[2]

The process by which an abscess or a tumour is thus brought to the surface of the body, Mr Hunter regarded as a combination of interstitial and progressive absorption—*interstitial*, because particles, from the interstices only of the part, are for a time removed, the part still remaining—*progressive*, on account of the tending to the surface, till at length the surface gives way, and the abscess or the tumour finishes its progress by being exposed or evacuated. By the process in question, the internal parts of the body are, to a certain extent, protected from the intrusion of such diseases, and in many cases a cure is effected by the discharge of the morbid accumulation or growth. Hence Mr Hunter called interstitial and progressive absorption, the *natural surgeon*.[3]

If, then, the thick bones of the cranium are forced to yield, how much more readily will the bones of the orbit suffer from the same process, excited either from within that cavity, or without, from the surrounding cavities, the nostril, the frontal, maxillary, and sphenoid sinuses, or the cranium!

§ 1. *Pressure on the Orbit from within the Orbit.*

Various causes within the orbit may, by pressure, produce dilatation and absorption of its walls. I have seen the orbit slowly enlarged by the growth and pressure of a diseased lacrymal gland, till it was of size sufficient to contain the fist, and at several points had given way. Effused blood, collections of matter, aneurisms, enlargements of the eyeball, encysted and other tumours, are all capable of producing such effects.

If pressure from within the orbit is sudden, it will in some cases produce inflammation of the bones, and caries; but if carried on slowly, perhaps during the course of many years, dilatation and absorption, without any formation of matter, and even without inflammation, will be the effect. It sometimes happens, however, that after the orbit has been slowly dilated, and perhaps partly absorbed, in consequence of the pressure of a morbid growth within it, the tumour begins to inflame and form matter, and this action, spreading to the surrounding parts, brings on caries. If it is the roof of the orbit which becomes affected in this way, the dura mater inflames and secretes pus, the brain participates in the disease, and death follows more or less speedily.

§ 2. *Pressure on the Orbit from the Nostril.*

The nostril communicates with the orbit by the lacrymal passage. The os unguis and os planum of the ethmoid form a thin partition between these cavities; a partition which, but for the tendency already referred to, which morbid growths have towards the external surface, would often be broken through by nasal polypus. This tumour, after filling the nostril in which it has originated, dilates it at its anterior opening, pushes itself backwards, so as to appear behind the veil of the palate, and presses the septum narium aside, so as to amplify the cavity of the one nostril at the expense of the other. It is not, in general, till the nostril is in this way greatly dilated, and of course the face much disfigured, that the polypus pushes itself through the os unguis, and projects, covered by the inflamed integuments, in the situation of the lacrymal sac. Previously to this, however, the passage for the tears is obstructed, and a painful feeling of pressure experienced in the orbit and through the head. If the polypus continues to advance, the nasal bones will be separated from the superior maxillary, the orbit will be still more intruded upon, the eyeball displaced, vision lost, and at last even the cavity of the cranium giving way, the morbid growth may come into contact with the brain.

Nasal, much more rarely than antral polypus, is the cause of deformation of the orbit, and of such destructive effects as I have just now enumerated. Antral is apt to be taken for nasal polypus; and I strongly suspect that in several recorded cases, this mistake has been committed. In all cases of exophthalmos, or protrusion of the eye, it is necessary carefully to examine the nostrils with the finger and the probe, lest polypus of the nose or of the antrum be the cause.

Antral polypus, having by pressure destroyed the bones and mucous membrane, which separate the antrum from the nose, sometimes pushes its way into the nostril, and imitates a nasal polypus; nay, I have known a polypus of the antrum to traverse both nostrils, and project at the inner angle of each orbit.

I do not conceive it necessary to enlarge on the treatment of nasal polypus. Early extirpation ought to be practised.

§ 3. *Pressure on the Orbit from the Frontal Sinus.*

If we consider that when the frontal sinus is enlarged independently of disease, it separates the orbitary plate of the frontal bone into two laminæ, as may not unfrequently be observed in the skulls of old persons, and sometimes in the young, it will not appear strange that the pressure of a diseased and dilated frontal sinus should deform the orbit, displace the eyeball, destroy vision, and ultimately disorganize the bones upon which the pressure is exercised.

The frontal sinus, like the maxillary, is liable to several different kinds of disease; namely, 1st, Inflammation of its lining membrane, ending in a collection of matter, which may be either thin, or thick and curdy; 2d, Encysted tumours, or what some have chosen to call hydatids; 3d, Tumours, more or less solid, which are considered to be of the nature of fungus or polypus.

1. *Inflammation of the frontal sinus, ending in a collection of matter.* The frontal sinus, on each side, is lined by a thin fibro-mucous membrane, a continuation of that which lines the nostrils. The two sinuses are separated by a bony partition, which rarely runs in the course of the middle line; so that, in general, the one sinus is larger, and, in many instances, much larger than the other. Each sinus communicates with the middle meatus of the nostril, through the medium of the anterior ethmoid cells. The communication is narrow and circuitous. Whether the diseases of the frontal sinuses are mainly, or frequently, or at all, to be attributed to accidental closure of this communication, I shall not pretend to say. Beer has mentioned sudden suppression of severe catarrh, as a cause of matter collecting within the sinuses. It is known, that in cases of wounds penetrating into these cavities, their lining membrane inflames, and secretes a white puriform mucus, which has sometimes been mistaken for the substance of the brain. Cold, and the other causes which give rise to the inflammation of mucous surfaces may also affect the lining membrane of these cavities; and in scrofulous constitutions, curdy pus will be apt to collect there, as it often does in the maxillary sinuses.

Suppression of the natural discharge of the Schneiderian membrane, or of that discharge when increased by disease, seems occasionally to be the cause of amaurosis;[4] probably through the medium of cerebral congestion.

It is scarcely necessary for me to quote examples of simple suppuration of the frontal sinuses; I shall refer the reader to the cases related by Runge[5] and Richter.[6] One of these recovered after the

diseased cavity was opened externally; another, after bursting of the matter into the nostril; while a third proved fatal after spontaneous discharge of the matter through the external table of the frontal bone, and through the middle of the upper eyelid.

In the early stage of inflammation of the frontal sinuses, the obscurity of the symptoms will rarely permit any decided judgment to be formed of the case, or any active treatment to be adopted. In all the three cases to which I have referred, the disease had advanced, either to a considerable protrusion of the outer wall of the affected sinus, or even to the giving way of the cavity, and the evacuation of the contained matter, before any suspicion seems to have been excited. Leeches to the inside of the nostrils, and other antiphlogistic means would, of course, be adopted, were we early enough called in, and did the pain, and other symptoms, appear to indicate inflammation of the lining membrane of the sinus. Emollient, and afterwards stimulating vapours, drawn up into the nostrils, might be tried. If they succeeded in exciting a considerable discharge from the Schneiderian membrane, this might tend to relieve the inflamed state of the sinuses.[7]

In the suppurative stage, perhaps counter-irritation, and a variety of other measures, might prove useful.

The last stage, in which the frontal bone becomes deformed, thinned, softened, so that it yields to external pressure, like a piece of elastic cartilage, or is even perforated by absorption, or by caries, can scarcely be mistaken. The opening, however, which is formed in the bone, and ultimately in the integuments, is not above, or on a level with, the eyebrow, where a careless examination of the anatomy of the frontal sinuses might lead us to expect it, but close to the inner canthus; so that the case might be mistaken for a disease of the lacrymal sac, till the probe, taking a direction upwards and backwards, showed the true nature of the case. In a patient of the Glasgow Eye Infirmary, the first symptom which attracted notice was the abscess pointing under the skin, immediately above the tendon of the orbicularis palpebrarum. No pain had attended the first stage of the disease. A large quantity of thick pus was discharged for a length of time. The eye was not affected.

In this stage, there cannot exist any doubt about the propriety of extensively laying open the sinus, either with a strong curved knife, or a small trephine, evacuating its contents, endeavouring to improve the state of its lining membrane, by lunar caustic injections, and the like, and then allowing the parts to granulate and heal.

In one instance in which Beer trepanned the sinus, not merely was that cavity restored completely to its natural state, but the eyeball returned to its proper place in the orbit, and vision was recovered. In a second case, in which the external appearances were not nearly so alarming as in the former, after opening the outer table, he found, on examining cautiously with the probe, that the inner was softened, and even drilled through; in this case the eye was totally blind, and Beer endeavoured merely to check the pro-

gress of the disease, by making a counter-opening through the conjunctiva, above the eyeball. In a third case, the symptoms were decidedly those of a collection of puriform mucus in the sinus, but the patient would hear of no operation being attempted. Five weeks after Beer's first visit, the outer wall of the sinus gave way of itself; and in the course of two weeks more, the eye was lost, and a great portion of the orbit and of the nose destroyed by caries. The other eye remained completely amaurotic.[8]

2. *Encysted tumours, or hydatids, of the frontal sinus.* Professor Langenbeck has published two interesting cases of pressure on the orbit from disease in the frontal sinus. He speaks of them as cases of hydatid; a term much misapplied by some of the German pathologists. Runge would have probably regarded them as cystic or encysted tumours; perhaps the one was nothing more than a collection of mucus, and the other of thick matter. The situations of the protrusion of the outer table of the bone, are amongst the most remarkable circumstances of these cases.

Case 75.—F. Reingarten, aged 17, enjoyed perfect health till she was eight years of age, when, having fallen into the water one hot day in 1802, she was seized next day with convulsions, followed some days after by an eruption. This was probably measles, but they ran an irregular course. In the autumn of the same year, she fell, so that her right temple struck against the sharp corner of a table, soon after which, a hard swelling appeared in the region of the right frontal sinus. Devoid of pain, it gradually extended towards the right temple, and involved the whole right side of the frontal bone. The right eye speedily became displaced by the swelling, in a direction outwards and downwards, and the power of vision gradually decreased.

In November 1818, the patient applied at the Surgical Hospital of Gottingen. At that period, the swelling extended upwards as far as the coronal suture. The orbital edge of the frontal bone, the eyeball, and the orbit were pressed downwards. The eye was covered by the eyelids, and not pressed out of the orbit, so that properly no exophthalmos existed; but the orbit rather, along with the eye, was pressed forwards, outwards, and downwards, so that the eye was in a line with the point of the nose. The fissura palpebrarum had a crescentic form. The eyeball could with difficulty be moved a little towards the nose; it preserved its natural form, and was not atrophic, but completely amaurotic. Although the swelling was on the whole hard, yet in the temporal region, and above the eye it yielded to the pressure of the fingers, and immediately rose again, when the pressure was relaxed, as if one were pressing the lid of a tin box. The swelling was entirely free of pain, except when one pressed hard on it, above the nose. That the swelling did not extend in the direction of the brain was evident from there being no sign of any disturbance in the cerebral functions. There was no headach, vomiting, vertigo, insensibility, or coma, and the patient's general health was good. From its situation, its hardness, and the circumstance that at certain points a thin lamina of bone could be depressed with the finger, and from the brain being free from suffering, it was concluded that the swelling depended on the frontal sinus being dilated, and filled with some morbid product.

Langenbeck proceeded to open the swelling on the 2d December 1818. At the place where the tumour yielded to pressure, he divided the integuments by a crucial incision. The outer table of the frontal bone was next penetrated by a perforator, and through the aperture thus made, a pair of forceps was applied so as to break away some pieces of the outer table. Through the opening there was discharged a clear ropy lymphatic fluid, escaping from a white shining cyst, which filled the whole frontal sinus, and which had been penetrated by the perforator. The cyst, or hydatid, as the narrator of the case styles it, was laid hold of with the forceps and partially extracted.

In order to ascertain the dimensions of the cavity, a measure was introduced.

From the opening to the orbitary process of the frontal bone, it measured three inches; to the frontal sinus of the opposite side, and to the posterior wall of the cavity, three inches and a half. With the finger the posterior wall of the sinus was distinctly felt. The anterior wall was thin and spongy. The cyst was thick, and where it had been attached, almost cartilaginous. Internally it formed several cells, containing a yellowish fluid.

The sinus was filled with lint, and after some days discharged a quantity of thin ichorous matter, for which injections of willow bark decoction, with myrrh, were employed. After a time injections containing corrosive sublimate were used, but, bringing on salivation, they were omitted. The internal treatment was at first antiphlogistic, but when the ichorous discharge came on, bark was given. The swelling subsided only in an inconsiderable degree when the patient left the hospital. In the winter 1819-20 she returned, with the swelling in the same state, and the discharge of matter still as abundant. Langenbeck now passed two setons through the sinus, by which means the discharge and the swelling diminished.[9]

Case 76.—A ploughboy, of 20 years of age, 11 years before his admission into the hospital, had, while playing at tennis, received a stroke with a racket on the left side of the nose, and on the left eye, the consequence of which was a great degree of swelling, which, after a time, completely disappeared. Two years afterwards, he began to feel pain in the part, and observed a protuberance at the inner angle of the eye.

When the patient came to the hospital, Langenbeck found the eyeball natural in form, the power of vision not affected, and the pupil lively. The eyeball, however, was pressed outwards and downwards, by a considerable swelling at the inner angle of the eye. The swelling had exactly the appearance and the situation of a greatly distended lacrymal sac, but was considerably bigger than we almost ever find the sac, even in its state of greatest enlargement. That this swelling did not consist in an enlarged lacrymal sac, Langenbeck concluded from his not being able to empty it, no mucus or tears being evacuated from the puncta on pressure, and the tears being duly conveyed into the nostril, without dropping upon the cheek. The patient's voice was similarly affected as that of one with polypus in the nose. The swelling communicated an obscure impression of fluctuation. At the inner side of the swelling, or towards the nose, it was bounded by a sharp edge of bone, which was felt exactly where the nasal process of the upper maxillary bone rises by the inner side of the orbit. As the surface of the swelling was not covered by any layer of bone, but felt soft and fluctuating, it was not easy to form a proper judgment regarding its seat, and one might have readily fallen into the error of supposing it to be an enlarged lacrymal sac. Against such a supposition, no doubt, there was the remarkable displacement of the eye outwards and downwards. As the swelling also extended from the inner angle upwards and towards the frontal sinus, Langenbeck concluded that that cavity was the seat of the disease.

An incision being made from above downwards, close to the sharp edge of bone which was felt at the inner side of the swelling, and in such a way as to avoid both the lacrymal sac and lacrymal canals, after the soft parts were sufficiently divided, a white glistening sac came into view. On touching this with the finger, it was evident that it contained a soft mass. Langenbeck separated the swelling as much as possible; but as he found that it extended deep into the nostril, he opened it, whereupon there issued from it a greyish-white tenacious substance. He cut away with the scissors as much as he could of the sac, and introduced his finger into its cavity. Its depth amounted to 3 inches. With the point of his finger he reached as far as the floor of the nostril. He could not reach the orbit, nor touch the eyeball. He felt from the diseased cavity the inner wall of the orbit, formed by the os planum of the ethmoid, a part of the orbitary plate of the frontal, and the os unguis. This wall of the orbit, along with the lacrymal sac, and nasal duct, was pressed outwards; hence arose the displacement of the eyeball, while the passage of the tears into the nose continued uninterrupted. Langenbeck introduced his forefinger up into the frontal sinus. He decided, therefore, that the disease had originated there, and had descended by the side of the nostril. He could now see into a large cavity filled with a greyish-white tenacious mass, which

he removed with his finger and a pair of forceps. This substance was contained in a shut sac, distinct from the mucous membrane of the sinus; and had it not been so, he thinks the substance in question would have made its way into the nostril. As has already been mentioned, the swelling was not covered by bone at the inner angle of the eye. It must, therefore, he thinks, have made its way either between the os unguis and nasal process of the superior maxillary bone, or it must have produced the absorption of the latter. This is the more probable conjecture, as the edge of the nasal process felt so sharp. The tenacious substance, which was extracted, was enough to fill a tea-cup.[10]

3. *Polypus of the frontal sinus.* I know of no case upon record, in which polypus was found in either of the frontal sinuses, without the same disease existing in the neighbouring cavities at the same time. It is, however, quite conceivable that a polypus might occupy one or other of the frontal sinuses, without any tumour of the same sort existing in the nostrils, or maxillary sinuses; and that slowly dilating the cavity in which it took its origin, it might displace the eye-ball, and attenuate and soften the external table of the frontal bone. Under such circumstances, the sinus should be opened; and as polypus is often attached by a narrow neck to the mucous membrane which gives it birth, the tumour might probably be extirpated with success.

Case 77.—In 1725, there died at the *Hôpital de la Charité*, in Paris, a lad of 17 or 18 years of age; who, subsequent to small-pox, had, for the space of three years, been affected with polypi. There were seven of them altogether; in the nose, throat, maxillary, and frontal sinuses. His appearance was hideous; his face enormously enlarged; his nose spread out to the usual width of the malar bones; and the upper maxillary bones greatly dilated. He had a very considerable protuberance at the root of the nose; his eyes were almost entirely protruded from the orbits; the distance between them was at least thrice the natural distance; and the tears ran over the cheeks, mixed with pus from two lacrymal fistulæ. The palate was so much depressed that it lay upon the tongue; the lower jaw was not changed in size or form, but it was continually depressed, so that the saliva flowed uninterruptedly. At the entrance to the nostrils, two polypi were seen, which completely filled these cavities; as was proven by introducing a flexible probe, which could be passed around each of the polypi, without meeting with any obstacle.

On dissection, the one superior maxillary bone was found to be at its middle as thin as the skin of an onion; while the other had already given way, so as to bring into view the thin and polished membrane enveloping a polypus, about two inches in diameter, reddish and very elastic, loose at all points except towards the nostril, where it was attached by a slender pedicle. The two frontal sinuses were converted into a single cavity, occupied by two polypi, which, united, might have equalled the bulk of the maxillary polypus just mentioned. Each of them was attached by a slender pedicle, close to the excretory passages from the sinuses. The lining membrane of these cavities was thickened. The orbits were found to be diminished in size by the intrusion of the polypi; the eyeballs consequently displaced; each os unguis completely separated from the other bones of the orbits, and so pressed upon as to have become convex instead of concave towards the cavities of the orbits; and the bones of the nose separated from each other, to the extent of several lines.[11]

§ 4. *Pressure on the Orbit from the Maxillary Sinus.*

The diseases of the maxillary are upon the whole analogous to those of the frontal sinus. They are more frequent, more variable, and generally more easily recognised. They dilate the cavity of the sinus, thin by pressure the bones which form its walls, and

orce them at last to give way. They disfigure the face, displace ae eyeball, and, if neglected, prove fatal.[12]

1. *Collections of mucus or of pus within the maxillary sinus.* A hin continuation of the Schneiderian membrane passes from the pper part of the middle meatus of the nostril, through a narrow perture, into the maxillary sinus, and forms its lining membrane. The fluid secreted by this membrane is apt to accumulate, con-ituting what some have called *dropsy of the sinus;* in other cases, his cavity is filled with thin puriform mucus, or with thick curdy us. Obstruction of the communication between the sinus and the ostril, cold, blows, affections of the teeth, small-pox, and various ther causes, have been mentioned as giving rise to these dis-ased accumulations, which have often been known to increase so uch as to elevate the floor of the orbit, and force the eyeball for-ards from its place, as well as to dilate and even perforate the uter wall of the sinus. As an important diagnostic sign, it may e mentioned, that in cases of mucous or purulent collection within he sinus, or of accumulation of fluid in a cyst developed in the ubstance of the bone, the external bony shell generally becomes so hin, as to yield and crackle under pressure like a piece of parch-ent. This symptom is awanting in exostosis, and also generally in ngus or polypus of the maxillary sinus. It is right, however, ever to depend entirely on external diagnostic signs in diseases of ae antrum, but always, before proceeding to any further operation, o perforate, or attempt to perforate the tumour, so as to ascertain s nature. In a case related by M. Gensoul, the incompressibility f the tumour led him to suppose it to be bony, and he was pro-eeding to the excision of the upper maxillary bone, when, on lunging a pair of scissors into the swelling, it proved to be a collec-on of mucus.[13]

For an example of apparently simple accumulation of mucus ithin the maxillary sinus, I may refer to a case which occurred to M. Dubois.

Case 78.—The patient when a boy of 7 years of age, was observed by his arents to have a hard round tumour, about the size of a filbert, near the root of e nasal process of the left upper maxillary bone. It gave no pain and did not pear to be increasing. A blow, however, which he received about a year after a fall, excited this tumour to grow, which it did by almost insensible degrees l he was 15. It then began to enlarge more evidently and to cause slight pain. y the time he was 18, it was so considerable in size as to raise the floor of the bit, so that the eye was pressed upwards and appeared less than the other, on count of the limited motion of the lids. The palate was depressed, so that it rmed a swelling of about the size of an egg divided longitudinally; the nostril as almost completely closed, and the nose was twisted to the right. The cheek as prominent; and the skin below the lower eyelid, and covering the upper rt of the tumour, was of a livid colour, and seemed ready to give way. The per lip was pushed upwards, and the whole length of the gums on the left side d advanced beyond the level of those on the right. Breathing, speech, mastica-n, and sleep, were impeded.

Sabatier, Pelletan, and Boyer being called into consultation, the unanimous inion appears to have been that this was a case of fungus of the maxillary sinus, quiring an operation. So much thinned was the bone behind the upper lip, at Dubois felt there a degree of fluctuation, and proceeded to open the sinus at

that place, expecting merely to give issue to a small quantity of ichorous fluid, and then to encounter the fungous tumour. The opening, however, allowed a very considerable quantity of ropy substance to escape, similar to what is found in ranula. The probe being passed into the opening, entered evidently a large cavity, quite free of any kind of fungous or polypous growth. It is probable that the opening made at this first operation, if kept from closing, would have served for the complete cure of the disease; but Dubois appears to have thought differently, and proceeded, five days afterwards, to extract three teeth, and to remove the corresponding portion of the alveolar process. This enabled him, on placing the patient on a favourable light, to see the whole interior of the dilated sinus, at the upper part of which, and near to the edge of the orbit, he discovered a canine tooth, which he extracted. After this, the cavity gradually shrunk; the tumour of the cheek, that of the palate, and the displacement of the nose, continued for some time; but after 17 months no deformity existed.[14]

A collection of pus within the maxillary sinus, whether produced in consequence of primary inflammation of its lining membrane, or of inflammation excited by diseased teeth, which is more generally the case, is not unfrequently evacuated in part through the opening of the sinus into the nostril; much oftener, however, that opening appears to be obstructed, so that the pus oozes through the alveoli, or collects and distends the sinus, producing a series of symptoms similar to those which existed in the case of simple mucocele just quoted.

Case 79.—Some years ago, I had under my care a gentleman, in whom the left maxillary sinus was affected with this disease, to such a degree that the face was strikingly deformed, the bone absorbed at the most prominent part of the cheek, and the eye partially displaced. I directed the second molaris, which was in a decayed state, to be removed; and through the alveolus, I perforated the sinus so as to give exit to a considerable quantity of purulent fluid. I then pushed up a lacrymal style into the opening, removing it every day, and injecting the sinus with tepid water. Under this treatment the secretion of matter ceased, and the sinus shrunk to its natural size.

In neglected cases of suppuration within the maxillary sinus, various parts of its walls are apt to be absorbed in consequence of the pressure of the accumulated pus, or rendered carious from inflammation. The floor of the orbit sometimes suffers these changes. The matter, issuing from the sinus, infiltrates behind the lower eyelid, which swells and inflames, sometimes in the neighbourhood of the lacrymal sac, and at length there is formed a fistulous opening through the eyelid, by which matter is from day to day discharged. Perhaps the patient is brought to us in this state, when on passing a probe along the fistula, we readily ascertain that it enters a diseased maxillary sinus.

Case 80.—In a case of this sort, in which the eye was already lost and the floor of the orbit fistulous, Bertrandi, having introduced a probe, or slender perforator, along the fistula into the maxillary sinus, directed it as perpendicularly as he could against the inferior wall of that cavity, and while with two fingers of his left hand he pressed against the roof of the mouth, he pushed the instrument through the alveolar process from above, between the last two molares. After this operation, the pus ceased to flow by the fistula of the orbit, and the patient recovered.[15]

The mode of operating followed in this case may be adopted, when the jaws, as is sometimes the case, cannot be sufficiently separated to permit a similar opening into the sinus to be made from below. Wherever the opening is made, whether at the fossa canina,

through one of the alveoli, it ought to be kept patent, either by dossil of lint, a lacrymal style, or a silver canula, which is to be withdrawn daily, and the sinus injected either with water or a weak blution of nitrate of silver. The patient may also use a gargle equently, and press it up into the antrum.

Cases of suppurating maxillary sinus have sometimes been successlly treated by the introduction of a seton through the dilated vity, although this is not a practice to be much recommended. The ton is passed either through openings in the bone already formed the course of the disease,[16] or by new perforations. Weinhold netrates from the outside of the cheek into the diseased antrum, d brings out the perforating instrument on the palate;[17] Hedenus parates the cheek from its connexion with the superior maxillary one, and then pushes a strong needle, armed with woollen threads, rough the diseased cavity.[18]

In some instances, where the cavity was much dilated, a cure has een effected by practising an extensive opening into the side of e antrum above the alveoli;[19] and in others, only after considerable foliations of its walls.[20]

2. *Polypus or fungus of the maxillary sinus.* It may not be possble to recognise this very serious disease in its incipient stage; but, it advances, it always affects the neighbouring parts in such a ay, as to render evident the nature of the case, and vindicate the nployment of an effective surgical treatment. The dilated sinus is anged in form; the teeth belonging to the affected bone become ose, or fall out spontaneously; the alveolar process becomes ongy, and from its cavities there sprout out fungous granulations; ere is frequent bleeding from the corresponding nostril; respiraon through that nostril becomes impeded; and on inspection, a olypous mass is found stretching into it from the antrum; often the me growth raises the skin in the situation of the lacrymal sac; metimes it extends across the nostrils, producing by its pressure e absorption of the septum narium, and projects at the inner angle f the opposite eye also; the cheek is greatly dilated and deformed, d at length the prominent point of the bony shell gives way; the or of the orbit is destroyed, and the eyeball is pushed from its lace; the palate is softened and depressed; if nothing is done to move the polypus, frequent hæmorrhagies weaken the system, ectic fever comes on, and death closes the scene.

It scarcely admits of doubt that there are essential differences in e nature of the polypous or fungous growths, which are met with in e antrum. The success which has attended the treatment, in some ases, in which the tumour has not been extirpated, and the fatal sult in other cases, where extirpation of the tumour, or even exsion of the upper maxillary bone, has been accomplished, would ad us to this conclusion. There is reason to believe that the most equent, as well as the most dangerous diseases of the antrum, parke of the nature of fungus hæmatodes, which in some cases seems be formed entirely within the cavity, and in its progress, destroys

the bones; while, in other cases, the bones appear to be first affected, so that the disease is, in fact, osteo-sarcoma.

That the direction of the pressure of a fungus within the antrum, is different in different cases, is a fact of which I am fully convinced, from the cases which have come within my own observation. In some, chiefly children or adolescents, the principal protrusion is forwards and outwards, so that the floor of the orbit is less disturbed; in others, the pressure is chiefly inwards, so that the tumour speedily makes its appearance in the nostril, destroys the septum narium, and rises into view at the inner canthus of each eye, covered only by the integuments; while in a third set, and these chiefly old people, the fungus makes little or no pressure outwards, but proceeds inwards and upwards, causing absorption of the floor of the orbit, destroying the soft parts within that cavity by exciting inflammation and suppuration, and lastly affecting the orbitary process of the frontal bone.

I cannot better illustrate the effects produced on the orbit by polypus or fungus of the maxillary sinus, than by relating the following case:—

Case 81.—James Macculloch, aged 53, who became a patient, under my care, at the Glasgow Eye Infirmary, in February 1828, stated that he had been sensible of a stuffing of the right nostril for some years; that six months before his admission, he had been attacked with supra-orbital pain, darting towards the right side of his head; and in a short time after this, with pain in the region of the right maxillary sinus, stretching towards the floor of the orbit, and increased when he opened his mouth. This was soon followed by stillicidium lacrymarum; a soft elastic swelling, in the situation of the right lacrymal sac; and protrusion of the eyeball forwards, outwards, and upwards, from the orbit. He complained of a want of the sense of taste in the right side of his mouth. He slept little, on account of the pain above the eye. On examining the palate, it was found to be yielding and elastic under the right maxillary sinus. For several weeks, the vision had been double, in consequence of the displacement of the right eye. The conjunctiva was inflamed, the eyelids adhered in the morning, and in consequence of the exposed state of the protruded eye, a small ulcer existed at the lower edge of the cornea. The right nostril was found to be filled by a polypous excrescence, of a white colour, and medullary texture, which bled profusely on being touched.

After clearing away this substance with the polypus-forceps, a carious opening, sufficient to admit the end of the little finger, was found to exist between the nostril and the maxillary sinus. With the finger, introduced through this opening, it was ascertained that the sinus was completely filled with the same kind of polypous excrescence which had occupied the nostril. The clearing of the nostril was performed on the 19th; and it is remarkable, that this had so much relieved the pressure on the orbit, that five days after, when I proceeded to open the maxillary sinus, the ulcer of the cornea was already cicatrized, evidently in consequence of the eyeball having retreated somewhat into the orbit, so as to allow it to be better defended by the lids.

On the 24th, I made an incision, oblique in its direction, from above downwards, and from without inwards, through the cheek, down to the bone, with the intention of opening the sinus, and removing its contents. I found, however, that the polypus had already produced absorption of the outer wall of the sinus, to the extent of half an inch in diameter. Through this opening, the polypus was broken down and extracted. It resembled brain in colour and consistence. The bony parietes of the sinus were felt throughout to be diseased; its nasal side much disorganized; the os unguis gone; the orbital side, and indeed the whole interior of the sinus, denuded of its lining membrane. A long dossil of lint was introduced into the sinus. In a few days, a profuse secretion of white fœtid matter flowed from the whole of the internal surface of the sinus, on removing the dossil of lint.

By the 4th March, the nose and lacrymal region were much more natural in their appearance, and the eye more in its place. A solution of chloride of lime, (℈i to ℔ij of water) was daily injected into the sinus, with the view of correcting the fœtor of the discharge. The long dossil of lint was carefully introduced, so as to fill the cavity completely. By the 9th, all pain had ceased, the eye was still more in its place, the vision improved, and the shape of the face much more natural. The discharge had lost its fœtor, and was less in quantity. By the 18th, the double vision was gone. By the 27th April, there was very little discharge, and the vision was much improved. On the 5th August, the report runs thus:—"General health and local symptoms go on improving—On pressing the site of the lacrymal sac, thick white matter issues from the lower punctum, but is diminishing under the use of an injection of the nitras argenti solution—Antrum seems contracting, and discharges very little—Water injected by the opening, flows out by the nostril."

On the whole, this case proved much more satisfactory, than, from the very disorganized state of the sinus, I had expected. Vision and life were saved by the operation. More than six years after, the patient was in good health, the wound much contracted, the sinus still kept open with a bent wooden style, and no appearance of any reproduction of the polypus. In April 1835, however, Macculloch presented himself at the Eye Infirmary, with similar symptoms on the left side, as had formerly attended the commencement of the disease of the right antrum. He was ordered to be received as an in-patient, but appears to have declined admission.

In the case which I have just now related, the bleeding was easily restrained; but in other instances profuse hæmorrhage has followed the cutting or tearing away of the tumour, so as to demand the application of the actual cautery. This means has also been employed for destroying the remains of the fungus, when it could not be completely extirpated.

The sinus might have been cleared, in Macculloch's case, without making any incision through the integuments, namely, by detaching the cheek from the upper maxillary bone; but in this way, the discharge would of course have flowed into the mouth, which would have been very disagreeable to the patient, and he would have been exposed to foreign substances entering the sinus. When we are anxious about the personal appearance of the patient, we will perhaps prefer this mode of operating; but when that is less our object than a ready, effectual, and even less disagreeable method of getting rid of the disease, the incision through the cheek will be adopted.

The method of operating followed by Desault, in fungus of the maxillary sinus, consisted, not merely in opening that cavity, after detaching the cheek from the bone, but in removing, with the gouge and mallet, a considerable portion of the alveolar process.[21] I should regard this as in general unnecessary. Through the mouth, it may be somewhat difficult sufficiently to lay open the sinus; but by cutting through the cheek, the bone may be so completely exposed, and an opening made of such a size into the sinus, as shall readily permit the diseased mass to be removed. Since I first published these remarks in 1830, a still more formidable operation has been frequently performed for the cure of fungus of the maxillary sinus, namely total excision of the upper maxillary bone. This operation, first proposed by M. Gensoul, has been practised by Mr Syme, Mr Guthrie, and others. An operation of such severity should

be had recourse to, only where there is reason to conclude, first, that the disease is so confined to the maxillary and neighbouring bones, that it can be completely removed, and secondly, that it cannot be destroyed by any other method. A fungus completely confined within the antrum may always, I apprehend, be extirpated, without sacrificing more than a portion of its parietes; a malignant tumour, which has already thrown its ramifications into the nostril and the orbit, could not be removed, even by the sacrifice of several of the other bones of the face besides the upper maxillary. A malignant osteo-sarcoma of the maxillary bone is, I am afraid, a hopeless case. The most favourable cases for excision are the fibro-cartilaginous tumours of the bone.[22]

The following case is remarkable, on account both of the great degree of disorganization produced by the disease, and the simplicity of the method of cure.

Case 82.—A man, aged 36, applied to Dr Eble, on account of an ulcerated state of the left cheek, with protrusion and amaurosis of the eye of that side. The cheek was not merely inflamed and painful, but partly ulcerated, and the subjacent bone exposed, softened, and perforated in five different points. The probe, introduced through these openings, was met by an elastic fleshy substance, which completely filled the antrum, and by pushing up the roof of this cavity, had driven the eyeball forwards and outwards. The floor of the antrum was yet entire; but the alveolar process at one place, where formerly there had been a carious tooth, gave issue to a considerable quantity of fœtid ichor. The eye was so much protruded, that it could not be covered by the lids; the amaurosis so far advanced, that the patient could at a footstep's distance perceive very large objects but obscurely; the motions of the eye extremely difficult; severe nocturnal pain in the bottom of the orbit prevented sleep. The patient had always been healthy, except that for the last two years he had suffered from severe toothach, for which he had had three carious teeth extracted; and from ulcers of the gums. He had, moreover, experienced an increasing weakness of sight. At this period, the surgeons who attended him, opened twice a swelling over the second and third molares, and at each time a quantity of yellowish and slightly fœtid pus was evacuated.

In order to limit the farther spread of the ulcerative inflammation with which the cheek was affected, Dr Eble ordered leeches to the sound parts, and the diseased parts to be bathed with a lukewarm lotion, and carefully cleaned. The swelling and pains diminished, and the ulcerated places became cleaner. The matter not escaping easily from the antrum in consequence of the smallness of the openings, he dilated these with sponge-tent, and then endeavoured to destroy the polypous mass, by means of nitrate of silver, which he applied daily through one or other opening for the space of 10 minutes. In four weeks, there was a free space of 4 lines betwixt the edges of the openings and the polypus, so that he could now inject into the interval, twice daily, a saturated solution of nitrate of silver. This hastened very much the destruction of the polypus, for in 14 days the eyeball was perceptibly retracted, and its motions had become freer. The violent pains at the bottom of the orbit were at the same time mitigated, but vision was not improved, although the pupil was not so much dilated. In the 8th week of the treatment, Dr Eble removed with the scissors the portion of bone between two of the openings, and in consequence of this was enabled to apply the caustic more freely, by which the complete destruction of the polypus was effected in the 12th week. It now appeared that the osseous walls of the antrum were nowhere carious, but only spongy, and that the floor of the orbit had suffered very little. As the polypus shrunk, all the symptoms of amaurosis were removed, and the eye returned into its natural situation; a good-conditioned suppuration took place in the whole parts affected; the obstinate growth of the mucous membrane stopped, and the spongy bone became firmer in its texture; healthy granulations sprung from all

the openings; and these gradually contracted, until one after the other closed. In four months, the patient was perfectly cured.[23]

A most remarkable instance of successful extirpation of a maxillary fungus occurred in the practice of Dr Thomas White of Manchester. Indeed, the bones of the orbit appear to have suffered more in this case than in any other on record.

Case 83.—The patient was a female. In two years' time, the tumour, situated betwixt the left zygomatic process and the nose, put on a frightful appearance; having grown to such a bulk that it pressed the nostrils to one side, so as to stop the passage of the air through them, and thrust the eye out of its orbit, so that it lay on the left temple. Though thus distorted, the eye still performed its office. The swelling occupied the greater part of the left side of the face, extending from the lower part of the upper jaw, to the top of the forehead, and from the farthest part of the left temple to the external canthus of the eye. Upon handling the tumour, Dr White found an unusual and unequal bony hardness. It was of a dusky livid colour, with varicose veins on the surface, and there was a soft tubercle projecting near the nose, where nature had endeavoured in vain to relieve herself.

Dr White began the operation with a semi-circular incision below the dislocated eye, in order to preserve that organ, and as much as possible of the orbicular muscle; then carrying the incision round the external and inferior part of the tumour, he ascended to the place where he began, taking care not to injure the left wing of the nose. After taking away the external part of the tumour, which was separated in the middle by an imperfect suppuration, there appeared a large quantity of a matter like rotten cheese, in part covered by a bony substance, so carious as to be easily broken through. Abundance of this matter was scooped away, with a great many fragments of rotten bones. Upon cleansing the wound with a sponge, Dr White found the left bone of the nose, and the zygomatic process, carious, and removed them. He says there were no remains of the bones composing the orbit. The optic nerve was denuded as far as the dura mater; this membrane and the pulsation of the vessels of the brain were apparent to the eye and touch. The superior maxillary bone, in the sinus of which the disease had had its origin, was surprisingly distended, and in some places carious. The alveolar process was probably in this state, as Dr White mentions that he removed it. He then applied the actual cautery to the rest of the bones, taking care not to injure the eye and neighbouring parts, which were sound.

The patient drew her breath through the wound, and was so incommoded by the fœtid matter flowing into her throat, that she was obliged for several weeks to lie on her face, to prevent suffocation. Notwithstanding her miserable condition, nature at length assisted, laudable pus appeared, sound flesh was generated, and the patient recovered. The eye returned to its place, and she enjoyed the perfect sight of it. The only inconvenience that remained, was a constant discharge of mucus from the inner canthus of the eye.[24]

Mr Howship has illustrated, by a beautiful engraving, the great extent to which the bones, forming the parietes of the antrum, may be dilated by this disease.

Case 84.—The patient, whose skull he has represented, a woman about 30 years of age, was received into the Westminster Hospital, with an extraordinary swelling upon the right side of the face, producing great distortion of countenance, but not attended with any discoloration of the skin. The basis of the tumour extended upwards to the eye, which was almost closed, and reached below to the chin; the adjacent angle of the mouth being much depressed, and thrown out of its line, and the nose pressed aside towards the left cheek. In the most prominent part, the tumour projected about 4 inches beyond the general line of the bones of the face. On the inside of the mouth, the tumour was very large, having extended itself across the palate, nearly to the opposite teeth. The tumour was confined entirely to the bones about the upper jaw; it was apparently fleshy, and where it extended across the roof of the mouth, it was of a florid red colour. The teeth of the upper jaw, thrown out of their natural situation, formed an angle with the remaining part of the alveolar circle. All those teeth involved

in the extent of the tumour, were thus forced into the middle of the mouth, greatly impeding deglutition.

The disease was of five years' standing, and had begun with a small soft swelling in the right nostril. In this state, it had produced no uneasiness. On the presumption of its being a polypus, the tumour had been partially extracted at different times. These operations seemed only to accelerate the progress of the disease, aggravating the degree of uneasiness and pain the patient now suffered, and hastening the increase of the swelling. When the complaint had become more completely formed, there were two or three teeth, which from their horizontal position were very much in the way, and troublesome from their being loose. Although the operation of removing them required no great effort, it was attended with such an hæmorrhage as brought the patient very low, before it could be effectually checked. A second violent bleeding took place about three weeks afterwards, from a spontaneous breach in the softer part of the tumour. This reduced her so much that she languished only a week longer.

On dissecting the tumour, it proved to be a fleshy mass, or excrescence, not contained merely within the antrum, but surrounding and enclosing all the bones of the upper jaw. These bones had, from pressure, suffered a separation at their respective points of union, with such a degree of extension and attenuation of their substance, that in many places they were reduced to the thinness of paper. The os malæ was detached from the rest of the bones, and (though in its natural state a very solid bone) exhibited a cribriform appearance.

The origin and nature of the disease cannot be a matter of any doubt. The bones had most likely remained uninjured till the soft fungous vascular mass from within the cavity of the antrum began to operate, first by producing absorption of the membrane lining that cavity, and then by the pressure of its peculiar and partially organized texture, not exciting regular absorption of the bone, but sufficiently loosening its structure to admit of considerable distention. In the progress of the disease, as might naturally be expected, the circulation in the periosteum made some efforts towards repairing the mischief by the secretion of new bone, as happens in cases of necrosis, although this effort, owing to the almost disorganized condition of that membrane, had proved irregular and abortive.[25]

Case 85.—Janet Steel, aged 42, admitted into the Royal Infirmary of Edinburgh, on the 20th November 1834, stated that, about 10 years before, she had received a kick on the face from a cow, which was followed by swelling that never entirely disappeared. In the beginning of 1834, she began to suffer pain in the seat of enlargement, and at the same time remarked a great increase in the rapidity of the growth. The superior molar and bicuspid teeth of the affected side, soon afterwards loosened and came away. Within a few months of her admission, the progress of the disease had not been so rapid, but it had advanced so far as to be very distressing, and threatened to prove still more serious.

The cheek was considerably distended by a tumour springing from the superior maxilla, which, though firm, did not possess the hardness of bone. When the finger was drawn across the lower margin of the orbit, an inequality in its surface was detected, and the floor of the cavity could be felt distinctly elevated. The palate, throughout the whole of its extent on the left side, and also for some distance beyond the mesial plane, was greatly thickened, and extremely irregular on its surface, which exhibited the characters of a malignant ulcer. The patient in all other respects enjoyed good health, and it was, therefore, thought proper to attempt eradication of her formidable and extensive disease, which was evidently confined to the superior maxillary bone.

On the 28th, the patient being seated in a chair, a perpendicular incision was made, by Professor Syme, from the inner angle of the eye down through the lip, and another from the convexity of the malar bone to the angle of the mouth. The flap thus formed was dissected up, and the integuments on each side turned back so as to expose the whole surface of the maxillary bone. One blade of a pair of cutting pliers was then introduced into the nostril, and the other into the orbit, so as to divide the ascending nasal process. A notch was next made with a saw in the malar protuberance, which then readily yielded to the pliers. After this, only the palate and septum of the nose remained to be divided, which was one by first circumscribing the morbid surface in the roof of the mouth with a

sharp-pointed straight bistoury, and then cutting through the bone with the pliers. The diseased mass was now easily turned out to the side, and detached from its connexions, when it appeared that the tumour had been removed quite entire. It was of moderately firm consistence, and of a yellowish colour, springing from the maxillary bone, and filling the antrum. By its pressure, it had caused absorption, as well as displacement, of the floor of the orbit.

The arteries requiring ligature having been tied, the patient was conveyed to bed. An hour after the operation, the cut edges of the integuments were brought into accurate contact by the interrupted suture, except at the two points where the lip was divided, each of which was secured by the twisted suture, a sewing needle being used for the purpose. Cloths moistened with cold water were diligently applied. The wounds healed by the first intention, and the patient was dismissed on the 20th December, with wonderfully little deformity.[26]

Fungus of the maxillary sinus occasionally proves fatal, not so much by the hæmorrhage which attends it, or the hectic fever it induces, as by the pressure it causes on the brain. "I have seen," says Bertrandi, "a polypous excrescence, so situated, that inferiorly it destroyed the bones of the palate; it filled the mouth, and anteriorly consumed the maxillary bone; superiorly it pushed the eye almost out of its socket, at length it destroyed the roof of the orbit, pressed upon the brain, and the patient died apoplectic."[27]

Case 86.—Janet Anderson, aged 44, applied at the Glasgow Eye Infirmary, on the 25th March, 1838. She stated that 9 weeks before that date, her left lower eyelid had assumed a dark red colour, as if affected with ecchymosis from a blow. For 12 months she had been much troubled with pain in the left side of her head, attended by a feeling of pressure and stoppage in the left nostril, which was deficient in moisture and sense of smell. She complained of numbness over the left side of her face, and the hearing of the left ear was impaired. Both left eyelids, as well as the conjunctiva, were œdematous at her admission, a symptom which generally attends cases of pressure on the orbit, from whatever quarter or cause the pressure arises. She stated that since the swelling of the eyelids commenced, her head had been relieved. There were no symptoms of dacryocystitis. The vision and the power of moving the eye were natural. Tongue clean. Pulse 96. She was ordered to be bled at the arm, and to take 2 grains of calomel with half a grain of opium at bed time.

June 13th, Has not attended since 25th March, and went away without being bled or getting the pills. Pain gone. Still considerable swelling between the upper eyelid and eyebrow, with fluctuation towards the inner angle of the eye. Skin of a dark-red colour. Conjunctiva of lower eyelid red and swoln. The eyeball is somewhat displaced towards the side of the orbit. An incision being made through the upper eyelid into the swelling, some matter was discharged, and a considerable cavity was felt with the probe, extending to the periosteum of the orbit. A poultice was applied, and two aloes and blue pills ordered to be taken at bed time.

15th, Complains of chilliness about 6 o'clock P.M. followed by a hot fit. A grain and a half of sulphate of quina were ordered thrice a-day.

18th, Chilliness and feverishness diminished. The dose of sulphate of quina was increased to 2 grains.

24th, Feverishness gone. Sulphate of quina continued.

28th, A swelling projects from beneath the eyeball of considerable size, and possessing an indistinct fluctuation. The discharge from the opening above the eyeball has become very trifling. She states that purulent matter is frequently discharged through the left nostril.

July 5th, Last night the swelling opened spontaneously, a little below the inner canthus, and discharged a considerable quantity of thick matter. A probe, introduced by the opening, passes through the lower eyelid, nearly to the outer canthus, and also back into the orbit, to the depth of about an inch.

13th, Fluctuation being felt below the eyeball, an incision was made with a lancet to the depth of an inch, but no matter flowed.

23d, She was ordered to omit the sulphate of quina, and to take 2 grains of calomel with half a grain of opium thrice a-day.

Feeling her strength declining, she left the Infirmary on the 29th; and died on the morning of the 4th August.

The eyeball was found in a state of exophthalmos, and pressed towards the temple; the conjunctiva in a thickened and fleshy state. The whole surface of the left hemisphere of the brain was covered with thick, green, and very fœtid pus. At the forepart of the left anterior lobe there existed a very considerable depression of the cerebral substance, to the extent of about ¾ths of an inch in diameter, and the membranes covering this spot were much discoloured.

On raising the left anterior lobe from the orbitary process, purulent matter was seen to issue from the orbit, through an ulcerated spot of the dura mater, towards the nasal edge of the roof of the orbit, where there was a small carious perforation of the bone. This opening corresponded to the depression on the surface of the brain already mentioned. It seemed probable, that the matter, issuing from the orbit into the cavity of the cranium, had caused that depression, and that the matter had been confined there for a time, but, increasing in quantity, had spread itself over the surface of the brain, as already mentioned.

The orbit, besides containing a considerable quantity of pus, was filled behind, and to the nasal side of the eyeball, with a tumour of a whitish-yellow colour, and rather more than cheesy consistence, which, along with the collection of purulent matter, had pressed the eyeball forward and towards the temple. The muscles were displaced in the same direction.

The tumour, which had the usual appearance of antral polypus, filled the antrum completely, the bony partition between this cavity and the orbit being destroyed. The posterior part of the nasal wall of the orbit, and the greater part of the ethmoid bone, were reduced to carious fragments, mixed with thick offensive pus.

This case was considered by my colleagues and myself as one of orbital abscess; but the dissection proved it to have been one of antral polypus, the orbital disease being merely secondary, as well as the inflammation of the brain, of which the patient died. The circumstances which led us to regard it as an orbital abscess, were the appearances of the eyelids, the discharge of pus when they were punctured, and the total absence of any enlargement of the cheek, or any external dilatation of the antrum. The only circumstance upon which, perhaps, we did not lay sufficient stress in forming our diagnosis was the state of the nostril.

Case 87.—In 1817, I had an opportunity of examining a skull in the possession of Professor Prochaska, which had suffered an extraordinary change in structure and form from a tumour, which in all probability originated in one of the antra. The patient was 18 years old when he died. During his apprenticeship to a shoemaker, he had been ill-used by his master, knocked down by blows on the head, and kicked by him while on the ground, in consequence of which he began to be affected with weakness of sight, and prominence of the eyes. In 1786, he was brought to Prochaska, then at Prague. Both eyes were amaurotic, and protruding from the orbits, the bones both above the orbits, and at the sides of the nose tumified, and respiration through the nostrils obstructed. He continued in this state till 1791, without pain, and almost without any other inconvenience than the amaurosis. Gradually, however, the eyes protruded more and more; the face above the orbits, at the root of the nose, and throughout the whole upper jaw, became enlarged, as did also the palate, which began to project into the cavity of the mouth. Ichorous discharge followed from the nostrils, with frequent and profuse bleeding. For four weeks before his death he was confined to bed from weakness, breathing not at all through the nostrils, and with difficulty through the mouth; his mind, however, not affected. On the morning of the 18th September 1791, his mother found him insensible; and in the evening of that day, respiration through the mouth and nose being completely impeded, he died.

The head, examined externally, presented above the eyes two tumours into which the supraorbitary arches had degenerated, while the root of the nose, and the upper jaw on each side, were so much swoln that no part of the nose but the point and pinnæ was visible.

On dissection, the right nostril at its anterior part was found greatly dilated,

the cartilaginous septum being pushed to the left side; posteriorly, the osseous septum was destroyed, and both nostrils were converted into one ample cavity, filled by a tumour, remarkable for its spongy excrescences, and which by its pressure had dilated and pushed down the palate. On opening the cranium, the anterior and middle lobes of the brain were found to be of an unnatural ash colour, and that portion which lies upon the cribriform plate of the ethmoid and orbitary processes of the frontal bone dissolved, along with the dura mater, into a pulp of the same colour, and in contact with the tumour proceeding from the nostrils. On account of the morbid condition of the brain, none of the nerves from the olfactory to the auditory could be distinguished. The internal part of the basis of the skull, from the orbitary processes of the frontal to the basilar process of the occipital bone, was tumified and softened. After this examination was made, the head was submitted to maceration, which being finished, there fell out from the basis of the cranium, and from the nostrils, a ponderous mass, partly like lard, partly cartilaginous, but not at all osseous, which, by means of its soft processes, had penetrated into the osseous swellings above the orbits, filling all the interstices of the radiating laminæ into which these swellings had degenerated, and emerging at these places under the common integuments.

The following was the state of the cranium. The orbitary processes of the frontal bone, the ethmoid, the vomer, the turbinated bones, the little wings of the sphenoid, and its middle part, (except the anterior clinoid processes which adhered by osseous filaments to the remaining part of the sella Turcica,) the anterior part of the basilar process of the occipital bone, and the apices of the petrous portions of the temporal bones, as far as the carotid canals, were so completely consumed, that the vast cavity of the nostrils, along with that of the mouth, opened into the cavity of the cranium. Forth from the cranium also, as well into the compressed and deformed orbits as into the supra-orbitary swellings already described, there were many larger and smaller openings. The superior maxillary bones, with their nasal processes, and the proper bones of the nose, were much expanded, and so thinned away, that they presented various gaps, opening into the cavity of the nostrils. The palatine processes of the superior maxillary bones had disappeared; the pterygoid process of the sphenoid bone, on the right side, had so receded in its superior part, that the spheno-palatine foramen much enlarged, opened into the zygomatic fossa. The left antrum Highmorianum had disappeared from compression, and the right opened backwards by a large hiatus.[28]

Fig. 9.

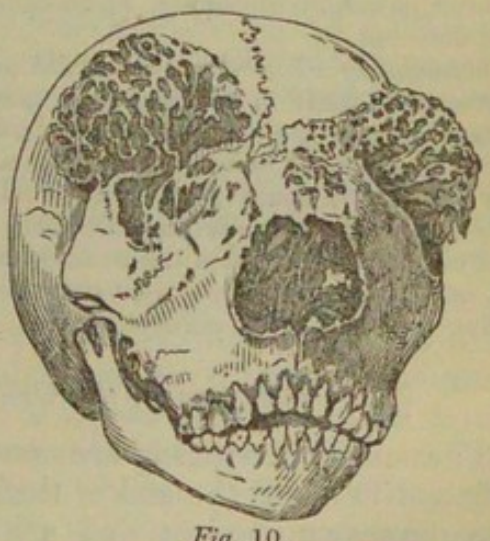

Fig. 10.

The fatal termination of fungus of the antrum, when left to itself, and the favourable result of extirpation of the tumour, or excision of the upper maxillary bone, in many cases now recorded, should lead us at once to propose an operation, and not for a single day to leave the tumour to proceed in its slow but certain work of

destruction. The advocates for excision of the bone speak very positively regarding the fruitlessness of any other mode of treatment. "The opening of the cavity, and the attempt to clear it of the soft pulpy mass which occupies it," says Mr Liston,[29] "as formerly practised, is totally inadvisable; it is a piece of unmeaning and utterly useless cruelty. If any thing is to be done, it ought to be set about with a thorough determination to go beyond the limits of the morbid growth, to remove the cavity which holds it, and thus get quit, if possible, of all the tissues implicated, or which may have become disposed to take on a similar action." These opinions of Mr Liston must appear far too dogmatical to any one who attentively considers the cases on record, in which the plan of operating which he condemns, appears to have been completely successful.

Mr Pattison[30] makes mention of two cases, in which tying the common carotid artery, without any other operation, was sufficient to cure this disease. In the hands of others, this means has failed.[31]

3. *Aneurism by anastomosis of the maxillary sinus.* In his Appendix to Burns on the Surgical Anatomy of the Head and Neck, Mr Pattison has given some particulars of a case, which he considered to be of this nature, and for which he tied the common carotid artery.

Case 88.—The disease had existed for many years, and under the notion of its being a polypus either of the nose or the antrum, attempts had been made to extirpate it. These were abandoned, however, on account of the hæmorrhage which they produced, and the patient afterwards continued to be troubled with violent bleedings from the tumour on the least exertion. The morbid growth had expanded the antrum, deformed the face, and protruded the eye, like other tumours in the same situation; but on pressing the diseased mass between two fingers, the one introduced into the mouth and another placed externally, that peculiar pulsatory throbbing, which characterizes anastomosing aneurism, was at once detected.

Immediately after tying the carotid artery, the appearance of the tumour, as it presented itself in the nostril, became remarkably changed. Just before, it seemed distended, almost to bursting; but as soon as the direct circulation into it was removed, its distension ceased, its surface became shrivelled, and its pulsatory movement could no longer be felt. The appearance of the countenance daily improved; the swelling subsided; the malar bone and zygoma, which had been completely buried in the tumour, as it was absorbed, again became evident; and two years and a half after the operation, the remaining deformity was so trifling as to be hardly perceptible.[32]

§ 5. *Pressure on the Orbit from the Sphenoid Sinus.*

The sphenoid sinuses are each, when fully developed, of size sufficient to admit the end of the little finger. They are very variable, however, in size; and are large or small, according as the frontal sinuses are more or less expanded. They lie before and beneath the sella Turcica, below and to the inner side of the foramen opticum, and to the inner side of the spheno-orbital fissure. The partition which separates the one sinus from the other, rarely runs in the middle plane of the body. They communicate with the upper meatus of each nostril, and, like the other sinuses of the face, are lined by a continuation of the Schneiderian membrane. From

analogy, then, we should conclude that they are subject to the same diseases as the frontal and maxillary sinuses.

I know of no instance on record in which the sphenoid sinuses were dilated by suppuration. In a case recorded by Dr Bright, in which a fungous growth is mentioned as having occupied this situation, the appearances are but loosely described. The chief symptom during life was tic douloureux in the corresponding side of the face.[33] Dr Carswell has figured a medullary tumour projecting into the cavity of the cranium from the cells of the sphenoid bone.[34]

The consequences on the orbit of dilatation of the sphenoid sinuses, and on the vessels and nerves entering that cavity, may readily be conceived. Expansion of the sinuses could not take place easily, either downwards or backwards; and were their walls to be pressed either upwards or outwards, they would deform the posterior part of the orbit, impede the circulation of blood to and from the eye, and destroy its sensitive power and motion.

In a case in which I was consulted, of severe neuralgia of the face, which resisted all remedies, and was attended with palsy of the muscles of the eye, ulcer of the cornea, and amaurosis, the uvula was dragged completely to one side of the fauces, while on the opposite side, and behind the velum, there was a firm tumour, which I conjectured might arise from a dilatation of one of the sphenoid sinuses. It also occurred to me, that were this conjecture just, the cavity of the distended sinus might, in such a case, be artificially opened, and its contents evacuated, through the mouth.

§ 6. *Pressure on the Orbit from the Cavity of the Cranium.*

In some diseased states of the encephalon, the orbits are pressed forward; their roof becomes nearly perpendicular, forming a posterior wall to the cavity; and their apex approaching their base, they become much shallower than natural, and the eyeballs protuberant. This takes place in chronic hydrocephalus. It is remarkably the case in the hydrocephalic skull, figured by Dr Baillie,[35] and which is preserved in the Hunterian Museum at Glasgow. I have now before me the skull of an adult, so much dilated by a diseased state of the brain, that the distance from the external meatus auditorius to the crown of the head, which commonly measures 6 inches, amounts to 7½ inches; while almost every part of its parietes is so much thinned in consequence of pressure as to be diaphanous. The ordinary depth of the orbit is 1 inch and $\frac{7}{10}$ths, whereas in this skull it strikes one at the first glance as unnaturally shallow, and on measurement is found only 1 inch and $\frac{1}{10}$th in depth.

In another set of cases, one or other orbit, rarely both at once, although often the one and then the other, are not merely deformed by the pressure arising from disease within the cranium, but some part of their walls, and especially their roof, becomes involved by the disease of the brain or of its membranes, inflames, is partially absorbed, or is destroyed by caries or necrosis. Under such circum-

stances, death is generally preceded by amaurosis, and protrusion of the eye.

Many cases might be quoted of diseased dura mater producing the destruction of the orbit by pressure and absorption. Most of the cases of this kind on record appear to have succeeded injuries of the head, by blows or falls. In some of them the dura mater was diseased, without any remarkable morbid change of the brain; in others, the brain was likewise affected. In some, the disease of the dura mater was fungous; in others hydatiginous or encysted.

Disease originating in the pia mater or in the brain, and destroying the orbit, must necessarily be rare; but the case already quoted (page 58) from Mr Hunter, demonstrates the possibility of such an event.

The following cases are interesting, and will serve to illustrate the influence of diseases within the cranium, over the orbit and its contents:—

Case 89.—A man, 51 years of age, fell from his horse and received a severe contusion on the head. Four years afterwards, his memory began to fail; from day to day this defect increased, till he could no longer recollect what he had uttered a moment before. Frequent and violent epileptic fits succeeded, but appeared to yield to different remedies, employed during six months. Most severe and uninterrupted headach next supervened. No remedy was found to calm this symptom; and after six months, the patient died. For six weeks before his death, the left eye had been turned from its natural position in the orbit. On that side of the head, the pain had been comparatively slight.

On dissection, a considerable portion of the two tables of the middle anterior part of the right parietal bone was found carious; while various other places to a smaller extent were similarly affected. A fungous tumour, adherent to the dura mater, had produced the absorption of the roof of the left orbit, and thus made its way into that cavity. The same tumour had destroyed the cribriform plate of the ethmoid bone; and the corresponding portion of brain was also diseased.[36]

Had the patient survived for any considerable time longer, there can be no doubt that the existence of this fungous tumour pressing through the orbit, would have been manifested still more distinctly, by external changes.

Case 90.—Maréchal had under his care a young man, 20 years of age, whose left eye was prominent and turned outwards, in consequence, apparently, of a tumour at the inner angle of the eye, attended by headach, giddiness, watering of the eye, and dryness of the nostril. Maréchal attacked the tumour with caustic, and then punctured the eschar, when there flowed out two or three table spoonfuls of lymph, a little reddish in colour; after which the eye was restored almost to its natural place.

On being appointed surgeon to Louis XIV. Maréchal handed the patient over to Petit. When the eschar separated, something like a vesicle presented itself in the middle of the opening. On puncturing this vesicle with the lancet, a fluid escaped, similar to what had previously been discharged, only less in quantity. Two days after, a third was opened in the same way, but discharged very little. The eye again became displaced outwards and forwards, as it had been at the first; the head became heavy, fever supervened, and in a short time the patient died lethargic.

On opening the head, nothing remarkable was found in the brain; the dura mater investing the lower part of the middle lobe of the cerebrum appeared considerably elevated, and on endeavouring to detach it from the squamous portion of the temporal bone, it was found united to the bone, and the bone changed into a cartilaginous or fleshy substance. The roof of the orbit was changed in like manner; while three hydatids or vesicles, full of reddish fluid, and each about the

size of a walnut, were found, one in the orbit, a second, half in the orbit half in the cranium, and the third, in the hollow formed by the union of the sphenoid with the petrous and squamous portions of the temporal bone. That hollow, as well as the sphenoid bone, where it forms the optic foramen, was also softened. In fact, this altered state of bone extended from the petrous portion of the temporal to the inner angle of the eye, the os planum and the os unguis being likewise affected.[37]

Case 91.—A lighterman, stout and healthy, aged 29, after frequent bleedings from the right nostril, with an obstructed and snuffling respiration, for which he was unable to account, was attacked with a severe pain over the whole front of the head, accompanied by a sense of weight in that part, and extreme lethargy. Although naturally of an active, cheerful disposition, he became morose, indolent, and fond of solitude; at intervals he was attacked with tremors, cold perspirations, and syncope. These symptoms had become established, when the right eye began to protrude from its socket; his pain was at this time more severe, and a copious glairy discharge was set up from the nostril. As the disease advanced, his manner to his relations became strange, his intellect confused, and his gait unsteady. The protrusion steadily increased for several weeks. The pain did not abate, except for a few hours after occasional blood-letting. Convulsions at length ensued and terminated his existence, about three months after the commencement of the exophthalmos.

It is remarkable that he retained the vision of the affected eye up to the period of its protrusion; and before that symptom was obvious to his friends, he described the sensation of something pushing the eye out of its socket. During the whole period of his disease, although his bowels were extremely torpid, he had a good appetite, and little, if any, febrile irritation. These particulars Mr Travers learned from the surgeon and relatives of the patient, having himself seen him only a few days before his death.

On dissection, the following appearances were observed. Behind the right orbit lay a tumour, which had the appearance of an oblong polypous cyst; and anterior to this, and distinct from it, was a blood-coloured fungus, filling the orbit, and extruding the eyeball. The cyst lay anterior to the dura mater, adhering to its surface, and so situated as to make the right hemisphere of the cerebrum appear as if deprived of its anterior lobe. The ethmoid bone, frontal sinus, and orbitary plate of the os frontis, on the same side, were in a state of caries, so that the finger passed readily from the orbit into the cavity of the cranium and posterior nares. A large quantity of yellow viscid matter occupied the frontal sinus, such as had been discharged during life by the nostril. The os frontis in front of the sinus, and above the orbit was denuded, and presented numerous small ulcerations. The anterior lobe of the brain was discoloured and softened; there was a quantity of water in the left ventricle, and some fluid blood in the right. On making a transverse section of the right hemisphere of the brain, it was found broken down in its texture, and the dura mater partially absorbed at its basis, the tumour having opened into the ventricle. The right thalamus was much diminished in bulk, though entire. The hæmatoid fungus in the orbit was mingled with spiculæ of bone. The dura mater to which the cyst adhered was continuous behind the cyst, except at the lower part where it was destroyed. The disease appeared, therefore, to be connected with the external surface of the dura mater, and by its increase, to have occasioned absorption of the bones, and displacement of the eye, and ultimately to have ulcerated through the dura mater, and anterior cerebral lobe, and discharged itself into the right ventricle. The eye and its muscles were sound; as were also the optic and other nerves of the orbit. The olfactory nerve had disappeared, along with the ethmoid bone, on the right side.[38]

Case 92.—A robust man, aged 48 years, whose employment led him to the frequent lifting of heavy loads into and out of a cart, was in the act, along with another labourer, of lowering from his cart a package of above 500lbs. weight, when his foot slipping, he was struck by the package on the head. No bad effects appeared immediately to result, so that he not only carried this load away to its destination, after placing it on his head, but continued for five weeks to pursue his ordinary occupation. After that period he began to complain of feelings of

internal, obtuse, pressing pain, in that part of the head where the right parietal bone, along with the frontal, forms the coronal suture; and the pulse became quick, full, and hard. To these symptoms, there followed epileptic fits, which were renewed several times in the course of the day. The fever and pain of head became mitigated, digestion and nutrition were unimpeded, but the patient continued for more than a year totally unfit for any employment, on account of the frequency of the epileptic attacks.

About 15 months after the accident, the pain of the head again increased, to such a degree, as to deprive him of rest both night and day, and to cause such suffering, that he could not help crying out. Violent fever and delirium accompanied the pain. These symptoms continued for several weeks, but the epilepsy ceased. The pain gradually descended to the right ear and eye, and in proportion as it became more severe in the orbit, it subsided in the upper part of the head. The eyeball became inflamed and swoln, and was protruded from the orbit. On raising the upper eyelid, the cornea was seen to be turbid, the pupil expanded and immoveable, the iris green, and vision very imperfect. Onyx followed, commencing at the lower edge of the cornea, and advancing till the whole cornea was affected. Violent pain continued, proceeding from the bottom of the orbit towards the external parts of the eye, and attended at length by a discharge of blood from the inner canthus and right nostril. After this, the pain ceased, and the patient had only two fits of epilepsy. The left eye, with the exception of a little redness at the inner canthus, was healthy. Memory failed, and the vital functions became enfeebled.

About 18 months after the accident, the epileptic fits returned, they were more frequent and more violent than before, and, some few short lucid intervals excepted, they were attended with constant stupor, and absence of mind. Respiration became impeded, and the patient died in violent convulsions.

On sawing through the cranium, the bones of the right side were seen to be bent outwards, they were harder than those of the left, their two tables thicker, and their diploe wanting. The vessels of the dura mater were dilated, and filled with blood. That membrane firmly adhered at every point to the inner surface of the skull, except over the roof of the orbit, where a considerable portion of it was separated from the bone, thickened, and in a state of suppuration. The dura mater, tunica arachnoidea, and pia mater, were at that spot united together, and firmly adherent to the brain. The corresponding part of the roof of the orbit was rough. The substance of the right hemisphere of the brain was softer than that of the left, and of a dirty brownish-white colour; the right lateral ventricle was enlarged, and filled with thin fluid; the lower surface of the right anterior and middle lobes was occupied by a number of steatomata, from the size of a pea to that of a filbert, and corresponding to the destroyed portion of the dura mater, and the rough part of the roof of the orbit. The Gasserian ganglion, and its three branches, were surrounded by a firm cartilaginous mass; the motor oculi was compressed and changed in colour. Within the cranium, the abducens was contracted to the size of a small thread; but both it and the motor oculi were of their ordinary thickness, within the orbit. The internal surface of the right side of the cranium, upwards to the middle of the frontal bone, and backwards over the little and great wings of the sphenoid to the sella Turcica, was rough. The cartilaginous mass surrounding the Gasserian ganglion was found to proceed through the spheno-orbital fissure into the orbit, surrounding the optic nerve, and so filling up the space between the superior, external, and inferior straight muscles, as to envelop their origin and vessels, the posterior part of the naso-ciliary nerve, the inferior branch of the motor oculi, the abducens nerve, and the ophthalmic ganglion. The same cartilaginous substance was traced through the spheno-maxillary fissure, into the zygomatic fossa.[39]

Case 93.—In June 1838, I lost a patient, in my private practice, from fungus of the dura mater. His age, when he died, was 69.

He first consulted me about ten years before his death, on account of stuffing in the nostrils, loss of sense of smell, deafness, and gradually increasing amaurosis. These symptoms occurred in the order in which I have mentioned them. The amaurotic affection ended in total blindness in 1830; and about a year after that, his eyes were observed to protrude considerably from their sockets. This

symptom went on increasing, and the right temple became dilated, and elevated, by some cause residing within the orbit. The swelling in the temple was very painful to the touch, or when he had the part shaved. For a long time he suffered severely from headach, the pain commencing after the loss of sight, and about the time when the exophthalmos was first observed. About 18 months before death, the right eyeball was so much protruded that it burst, and was destroyed. About three years before death, he was attacked frequently, during six or eight months, with profuse epistaxis. At last he died dropsical.

At one period of his life, this patient snuffed a great deal, but he dropped that, and had recourse to smoking and chewing. He knew no cause of his disease; he could trace it to no fall or blow on the head. Indeed, previously to the stuffing of his nostrils, which was the first symptom, he had always been healthy, except that he was occasionally troubled with tremors, or rigors, for a few days at a time. He was not liable to headach before his sense of smell began to fail. He never had any fits, faintings, or paralytic symptoms.

The pain of his head was greatly relieved by the internal use of laudanum. From the state of complete deafness and blindness in which he was for some years before his death, it was difficult to know how far his memory or judgment was affected.

On inspection, the brain was found to be in no respect materially diseased. The pituitary gland was sound, and the cerebral surface of the dura mater was entire. Under the dura mater, between it and the basis of the skull, and especially behind the sella Turcica, there was an extensive fungous tumour, of a dark-red colour, soft and brainy in consistence. This tumour originated from the cranial surface of the dura mater. It spread across to each temporal bone, which were in a state of caries. It dipped into the nostrils and filled both orbits, their roof and posterior parts being removed by absorption, as was also the cribriform plate of the ethmoid bone, and the outer wall of the right orbit. The tumour, where it filled the right orbit and protruded into the temple, was unlike the rest, being firm and whitish, like cartilage. This portion could not be distinctly separated from the rest of the diseased mass, but it seemed probable, that this portion was the lacrymal gland, enlarged and changed in structure. The optic nerves, between their chiasma and the orbits, were pale, and flat like ribbons.

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[1] Medical Transactions; Vol. ii. p. 353; London, 1772.

[2] Hunter on the Blood, Inflammation, and Gunshot Wounds; Vol. ii. p. 307; London, 1812.

[3] Ibid. p. 287; London, 1812.

[4] See a case by Vater, in the Philosophical Transactions; Vol. xxxiii. p. 147; London, 1726.

[5] Runge de Morbis Sinuum Ossis Frontis et Maxillæ Superioris; in Haller's Disputationes Chirurgicæ; Tom. i. p. 212; Lausannæ, 1755.

[6] Novi Commentarii Societatis Regiæ Gottingensis; Tom. iii. p. 85; Gottingæ, 1773.

[7] See a case by Dr Tott, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xi. p. 662; Berlin, 1828.

[8] Lehre von den Augenkrankheiten; Vol. ii. p. 570; Wien, 1817.

[9] Neue Bibliothek für die Chirurgie und Ophthalmologie; Vol. ii. p. 365; Hannover, 1820.

[10] Ibid. p. 245. The reader will find an interesting case of hydatids between the tables of the frontal bone, related by Mr Keate, in the Medico-Chirurgical Transactions; Vol. x. p. 278; London, 1819.

[11] Levret, Observations sur la Cure de plusieurs Polypes, p. 235; Paris, 1749.

[12] On the diseases of the maxillary sinus, consult Bordenave, in the Mémoires de l'Académie Royale de Chirurgie; Vols. xii. and xiii. 12mo; Paris, 1774.

[13] Lettre Chirurgicale sur quelques Maladies Graves du Sinus Maxillaire et de l'Os Maxillaire Inferieur; p. 50; Paris, 1833.

[14] Boyer, Traité des Maladies Chirurgicales; Tome vi. p. 140; Paris, 1818.

[15] Ibid. Tome vi. p. 153.

[16] See a case treated by Ruffel, Mémoires de l'Académie Royale de Chirurgie; Vol. xii. p. 68; 12mo; Paris, 1784.

[17] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. iii. p. 62; Berlin, 1822.

[18] Ibid. Vol. ii. p. 397; Berlin, 1821.

[19] Chirurgie Clinique de Montpellier, par Delpech; Vol. ii. pp. 125, 130; Paris, 1828.

[20] See a case by Krimer, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. x. p. 606; Berlin, 1827.

[21] Œuvres Chirurgicales; Tome ii. p. 165; Paris, 1813.

[22] On excision of the upper maxillary bone, consult Gensoul's work already referred to; Syme, in Edinburgh Medical and Surgical Journal, Vol. xliv. p. 1; Guthrie, in London Medical Gazette, Vol. xvii. pp. 315, 618; Institutes of Surgery, by Sir Charles Bell, Vol. i. p. 233; Edinburgh, 1838.

[23] Ammon's Zeitschrift für die Ophthalmologie; Vol. i. p. 307; Dresden, 1831.

[24] White's Cases in Surgery, p. 135; London, 1770.

[25] Howship's Practical Observations in Surgery and Morbid Anatomy, p. 22; London, 1816.

[26] Edinburgh Medical and Surgical Journal; Vol. xliv. p. 2; Edinburgh, 1835.

[27] Traité des Opérations de Chirurgie, traduit par Sollier, p. 303; Paris, 1794.

[28] Prochaska has given two engravings, exhibiting a front and a side view of this remarkable skull, in his Disquisitio Anatomico-Physiologica Organismi Corporis Humani, p. 172; Viennæ, 1812. A reduced copy of these engravings, I have introduced into the text. The case of Louis Niacre, related by Alibert (Nosologie Naturelle; Tome i. p. 529; Paris, 1817), and that of a boy who died in St Bartholemew's Hospital, referred to by Mr Cooper (Dictionary of Practical Surgery, article *Polypus*), appear to have been examples of antral, not nasal, polypus.

[29] Practical Surgery; p. 261; London, 1837.

[30] Burns on the Surgical Anatomy of the Head and Neck, p. 484; Glasgow, 1824.

[31] Magendie, Journal de Physiologie; Tome vii; p. 180; Paris, 1827.

[32] Op. Cit. p. 464.

[33] Bright's Report of Medical Cases; Vol. ii. p. 506; London, 1831.

[34] Illustrations of the Elementary Forms of Disease; Carcinoma, Pl. ii. Fig. 7; London, 1838.

[35] Series of Engravings Illustrative of Morbid Anatomy; Fasciculus X. Plate iii. Fig. 1; London, 1799.

[36] Quoted from Jauchius, by Louis, in his paper on Fungous Tumours of the Dura Mater; Mémoires de l'Académie Royale de Chirurgie; Tome xiii. p. 62; 12mo; Paris, 1774. On fungus of the pericranium, skull, and dura mater, the reader may consult with advantage, Blasius de Fungi Duræ Matris accuratiori Distinctione; Halis Saxonum, 1829.

[37] Petit, Traité des Maladies des Os; Tome ii. p. 325; Paris, 1759.

[38] Travers' Synopsis of the Diseases of the Eye, p. 411; London, 1820.

[39] Landmann, Commentatio Pathologico-Anatomica exhibens Morbum Cerebri Oculique singularem; Lipsiæ, 1820.

CHAPTER II.

DISEASES OF THE SECRETING LACRYMAL ORGANS.

SECTION I.—INJURIES OF THE LACRYMAL GLAND AND DUCTS.

It must be difficult to wound the superior portion of the lacrymal gland, with any ordinary instrument, penetrating into the cavity of the orbit; still it might be possible to reach it, for instance, with a penknive, driven upwards, backwards, and outwards, into the fossa lacrymalis; and we can easily enough suppose the inferior portion, or glandulæ congregatæ[1], and the excretory ducts of the gland, to be divided, in such a penetrating wound. The effects of such an injury will be apt to resemble those of a wounded parotid gland or duct; that is to say, the frequent distilling of tears, like that of saliva, will be likely to prevent the healing of the wound, and produce what is termed a *fistula lacrymalis vera*. I know of no such case on record; but the thing is possible. A penetrating wound, then, which we suspect may have implicated the lacrymal gland, or divided some of its ducts, we should endeavour to unite with more than common care; employing for that purpose, sutures, strips of adhesive plaister over the wound, and a compress and roller over the eyelids, and enjoining the patient to keep the eye as much as possible at rest, till the cure be completed.

Lacerated wounds, going on to suppuration, and involving the lacrymal ducts, may end in the destruction or obliteration of these canals, and give rise to incurable lacrymal xerophthalmia.

Larrey relates[2] that a soldier received a musket shot towards the superior external angle of the left orbit. Half of the ball took the direction of the temple, and passed under the temporal aponeurosis, whence it was easily extracted; the other half penetrated into the orbit, and lodged in the lacrymal gland. The wound of the eyelids being enlarged, the remaining half of the ball was removed, along with the lacerated gland. The wounds healed readily, and the eye was not only saved, but continued to be sufficiently moistened to permit its ordinary motions to be performed.

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[1] Monro's Observations, Anatomical and Physiological, wherein Dr Hunter's claim to some Discoveries is examined, p. 77; Edinburgh, 1758. Rosenmüller, Partium Externarum Oculi Humani Descriptio; § 109; Lipsiæ, 1810.

[2] Clinique Chirurgicale; Tome i. p. 396; Paris, 1829.

SECTION II.—LACRYMAL XEROMA[1] OR XEROPHTHALMIA.

There are two kinds of xerophthalmia, or dryness of the eye, the one lacrymal and the other conjunctival; the former depending on a suppressed or imperfect secretion of the tears, the latter on a deficiency of the mucous secretion, which, in the natural state, lubricates the surface of the eye.[2]

Lacrymal xerophthalmia may be owing to a diseased condition of the substance of the gland, to a want of the proper nervous energy upon which its secretive power depends, or to an injured state of its ducts, such as may arise from an abscess behind the upper eyelid.

I am not certain that xerophthalmia is a common, though it may be an occasional symptom, in inflammation of the gland. The assertion that it accompanies scirrhus or enlargement of that body, is contradicted by the cases related by Mr Todd and Dr O'Beirne.[3] Yet we can scarcely suppose that the function of the lacrymal gland will go on without impediment, when its substance is either much inflamed or greatly indurated.

We are not surprised to meet with xerophthalmia in old people, either by itself or attendant on amaurosis, for in them the gland is much shrunk, and the nervous energy of the fifth pair, like that of all the nerves, is diminished. We meet, however, with this symptom as a frequent attendant on the incipient stage of amaurosis, even in those not far advanced in life; and we may hail, as a favourable sign, in such cases, the return of the lacrymal secretion, for we almost invariably find that after this change, vision begins to improve.

Chronic pains of the head are sometimes greatly relieved by a renewed activity of the lacrymal gland.[4]

We may regard the xerophthalmia which occasionally attends deep grief, as a purely nervous or sympathetic phenomenon.

In all those cases, when we look at the eye, no appearance of dryness is to be observed; for the mucous secretion of the conjunctiva is not affected. The eye looks as moist and slippery as ever, but the patient complains that it is never wet; or if it be at times bedewed with tears, great relief is experienced, evidently showing that the dryness depends on want of the lacrymal, not of the conjunctival, secretion.

If xerophthalmia seems to depend on inflammation of the lacrymal gland, or if we suspect any incipient affection likely to lead to enlargement or change of structure of that body, local bleeding, and the antiphlogistic regimen, will be necessary. Sternutatories are found useful, when want of nervous energy seems to be the cause. If the affection appears to be sympathetic, purgatives, tonics, and antispasmodics may be had recourse to. The influence of music has sometimes been very remarkable in removing the xerophthalmia attendant on grief.[5]

As a substitute for the tears, in xerophthalmia, Wathen recommends[6] the use of a saponaceous lotion. Three or four drops of aqua

potassæ, are to be added to 2 ounces of tepid water, filling about two-thirds of an eye-cup. This is to be applied to the open eye, for a minute or more. It gives little or no pain, brings away all the morbid excretions from off the eye and its lids, and as instantly removes what the patient calls the cloud from his sight. But as this will quickly return, its frequent application will be requisite. In order to excite, if possible, the natural secretion of tears, it ought to be made fresh every time it is used, and its strength gradually increased, till it becomes not only a wash, but a stimulus.

Keeping the eye, at intervals, in tepid water alone, for some minutes at a time, as the same author remarks, is not only a substitute for the tears, but along with the means already mentioned, serves also to relax the parts, and dispose them to resume their natural functions.

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[1] Xeroma, or xerophthalmia, from ξηρὸς *dry* and ὄμμα or ὀφθαλμὸς *eye*.

[2] Mr Wardrop has recorded (Lancet, 29 Nov. 1834, p. 344) a remarkable congenital case of lacrymal and conjunctival xeroma.

[3] See Section v. of this Chapter.

[4] Collections from the unpublished Medical Writings of the late C. H. Parry, M.D. ; Vol. i. p. 263 ; London, 1825.

[5] Dictionaire des Sciences Médicales ; Tome xxxv. p. 71 ; Paris, 1819.

[6] Method of curing the Fistula Lacrymalis, to which is added a Dissertation on Epiphora, &c., p. 71 ; London, 1792.

SECTION III.—EPIPHORA.[1]

This is the reverse of the last disease ; for the tears are secreted and discharged too abundantly, and too frequently. Like xeroma, however, epiphora may be regarded rather as a symptom than as a disease in itself.

Diagnosis. Epiphora must not be confounded with stillicidium lacrymarum. The difference is, that the latter arises merely from some incapability in the excreting parts of the lacrymal organs to remove the tears and the mucus of the conjunctiva, after they have done their duty ; while epiphora is a disease of the secreting lacrymal organs, or an over-discharge of tears.

Causes. Any mechanical or chemical irritation, applied to the conjunctiva, a particle of dust, for example, on the inside of the upper eyelid, instantly produces a discharge of tears, or epiphora, so that the foreign body may be forcibly washed away, or the chemical substance diluted.

Inflammation of the eye, or eyelids, and especially phlyctenular inflammation of the conjunctiva (the disease commonly known by the name of *scrofulous ophthalmia*), is an extremely frequent cause of epiphora. We observe that the subjects of the last-mentioned disease, if they attempt to open the eye, are affected with instant

epiphora, and spasm of the orbicularis palpebrarum. We can be at no loss to explain the connexion between the eyelids, conjunctiva, and lacrymal gland, when we recall to mind that the lacrymal nerve, a branch of the first division of the fifth pair, having passed through the lacrymal gland, spends its ultimate branches in the conjunctiva, orbicularis palpebrarum, and skin of the upper eyelid.[2] In many cases of scrofulous conjunctivitis, the redness is extremely slight, perhaps scarcely an enlarged vessel is to be seen on the surface of the eyeball, and as yet no phlyctenulæ have made their appearance, but the epiphora, and intolerance of light, are extremely acute.

Epiphora is occasionally a symptom of disordered digestion, especially in children, and of worms in the intestines. Indeed, even when connected with scrofulous ophthalmia, we may regard both the ophthalmia and the epiphora, as originating, in many cases at least, in improper food, and in disorder of the digestive organs. It may also be made a question, whether phlyctenular ophthalmia is not sometimes the consequence of lacrymation in children; the inordinate flow of tears being excited by the pain which accompanies teething, and by other causes.

Treatment. Before prescribing any remedy, general or local, for epiphora, let us assure ourselves that it depends on no mere mechanical irritation of the eye, such as that of an inverted eyelash, minute growth on the internal surface of either eyelid, or particle of dust imbedded in any part of the conjunctiva.

We seldom require to prescribe for epiphora alone. I have known it completely and permanently removed by an emetic. Purgatives, followed by tonics, and occasionally antacids, will be found highly useful in removing some of the more common causes of the disease. A mixture of rhubarb and supercarbonate of soda, repeated every day, or every second day, and followed up by a course of the sulphate of quina, is a plan of treatment which I have often found effectual.

Of local remedies, the most useful are the vapour of laudanum, and the lunar caustic solution. Into a cup of boiling water, a teaspoonful of laudanum is mixed, the cup held under the eye, the eyelids opened, and the vapour allowed to come into contact with the conjunctiva. The eye is then bathed with the mixture by means of a bit of old linen. This may be done twice or thrice a-day. A vinous solution of belladonna, substituted for the laudanum, and used in the same way with boiling water, is also serviceable. In some cases, nothing relieves more the irritability of the conjunctiva, on which epiphora so much depends, than a solution of 2 or 3 grains of lunar caustic in an ounce of distilled water, dropped on the eyeball with a camel hair pencil once or twice a-day.

Blisters are useful in epiphora. They are perhaps more likely to be so, when applied before the ear, or on the temple, as they will then act more directly on the branches of the temporal nerves, which anastomose with the lacrymal nerve.

[1] Ἐπιφορὰ, from ἐπὶ *upon* and φέρω *carry*.

[2] Soemmerring, Abbildungen des Menschlichen Auges. p. 44 ; Tab. iii. Fig. 5. ; Frankfurt am Main, 1801. Rosenmüller, Partium Externarum Oculi Humani Descriptio ; § 162 ; Lipsiæ, 1810.

SECTION IV.—INFLAMMATION AND SUPPURATION OF THE LACRYMAL GLAND.

The lacrymal gland is liable to become inflamed. Children of a scrofulous constitution are the general subjects of this affection, which is by no means a common one. The cellular membrane which connects the acini of the gland is probably the original seat of the inflammation.

Symptoms. Pain in the seat of the gland, and increasing fulness above the external angle of the eyelids, are the first symptoms which are remarked. I admitted a boy as a patient at the Glasgow Eye Infirmary, 17th February 1839, who, in consequence of a blow with a stone, was affected with swelling and redness of the upper eyelid, towards its outer extremity; the eyebrow was elevated, and the eyelid depressed; and on raising the eyelid, a considerable fleshy projection was seen between the inside of the eyelid and the eyeball, which I considered to be probably the inferior portion of the lacrymal gland in a state of inflammation. If only the superior portion of the lacrymal gland, or glandula innominata, be affected, the fulness may be long of showing itself, the part being covered by the os frontis; and for the same reason, the other symptoms will be more acute and more dangerous than if the inflammation involved only the glandulæ congregatæ. At length, a red and tense swelling rises at the upper outer angle of the orbit; the upper lid can be raised with difficulty, if at all; the conjunctiva is inflamed: and the eyeball is pushed forwards and inwards. When the inflamed gland is enlarged to the utmost, the sympathetic swelling of the neighbouring cellular substance advances so much in front of the globe of the eye, as completely to conceal it. The pain in the orbit and head becomes more and more severe. Unless the progress of the inflammation is arrested, fever, restlessness and delirium, usher in the local symptoms of suppuration; fluctuation becomes more and more distinct; and at last the matter points, and bursts through the upper eyelid. Unfortunately, it but too frequently happens, that before this discharge is afforded to the matter by the spontaneous bursting of the abscess, the periosteum of the fossa lacrymalis takes on inflammation, and the bone itself becomes affected. The case then turns out a very tedious one, ectropium of the upper eyelid follows (Fig. 5. page 34), and the fistula, as has already been explained, does not heal till the bone becomes healthy, or till the diseased portion of it is discharged, which may not be accomplished for years.

Causes. Blows on the external angular process of the frontal bone,

and exposure to cold, are, I believe, the common causes of inflammation of the lacrymal gland. Mr Todd, however, has stated, that the greater number of cases which had fallen under his observation, were not idiopathic, but succeeded to inflammation of the conjunctiva, or some other form of ophthalmia. He had known inflammation of the lacrymal gland to accompany what he terms the psorophthalmia of children, when that disease was severe, or aggravated by neglect, exposure to cold, or by the incautious use of stimulating or astringent applications. He is also of opinion, that in some cases, inflammation of this gland ushers in the ordinary forms of ophthalmia, and gives rise to symptoms generally attributed to inflammation of the eye alone.[1]

Forms. Besides the acute form of this disease, Mr Todd has described a chronic inflammation of the lacrymal gland, almost entirely confined to the early periods of life, and, in all probability, depending on a scrofulous predisposition. In this chronic affection, there is an obvious enlargement of the gland, with occasional œdematous tumefaction of the upper eyelid; the patient seldom complains of pain, but generally of a sensation of fulness above the globe, and an inability to move the eye of that side as freely as the other. On making pressure between the globe of the eye and the temporal extremity of the upper edge of the orbit, an immediate and copious discharge of tears is produced. Mr Todd appears inclined to attribute scrofulous ophthalmia to the morbid secretion of the lacrymal gland, during the course of chronic inflammation; and mentions the case of a young lady, who, on one side had chronic inflammation of the gland, with frequent attacks of pustular conjunctivitis, while on the other side, the gland was healthy, and no ophthalmia ever occurred.

Besides chronic inflammation, the specific nature of which is probably equivocal, Mr Todd represents the lacrymal gland as subject to an enlargement more decidedly scrofulous; characterized by the age and constitution of the patient; by the slowness of progress, although the gland in this affection sometimes acquires considerable magnitude; absence of pain; and the tumour presenting a surface more or less lobulated. He states that in some instances this affection, after a certain period, will continue stationary for many months, or even for years, while in others it will undergo that form of suppurative inflammation peculiar to scrofulous glands, and will thus prove a tedious and troublesome disease. It is probable that this scrofulous enlargement of the lacrymal gland, especially when the affection has existed on each side, has sometimes been confounded with scirrhus, or with the disease to be described in the next section under the name of chloroma.[2]

Treatment. In acute inflammation of the lacrymal gland, leeches are to be applied liberally to the upper eyelid, forehead, and temple; purgatives, rest, cooling lotions, and the whole antiphlogistic plan of treatment are to be adopted; venesection is to be employed, if the fever runs high.

When the symptoms become indicative of the formation of matter, a warm emollient poultice is to be applied over the swelling. When the matter has fairly formed, it must be evacuated. I doubt whether it will be possible to do this, under the upper eyelid, with a small knife, directed through the conjunctiva, towards the seat of the gland. If this plan is found possible, it ought to be followed. If not, the abscess must be opened through the upper eyelid, the incision being made parallel to the superior edge of the orbit. Matter will probably continue to be secreted for some time, after which the discharge will gradually diminish, and at length dry up; but it occasionally happens, that the external opening contracts to a very small diameter, and continues to discharge tears, forming what is called a true lacrymal fistula. This is still more apt to be the case, if the abscess has been allowed to burst of itself.

Called to a case of this sort, after the abscess has burst of itself, we ought to examine the sinus with a probe, to discover whether the bone is diseased, wash it out daily with a small syringe and some stimulating injection, keep it open with a tent if the bone be diseased, and especially if there be any suspicion that the diseased piece of bone is loose and likely to come away, and forewarn the patient or his friends, of the lagophthalmos and ectropium which will probably ensue, and which are very difficult of removal, even by operation.

In cases of chronic inflammation of the lacrymal gland, or of slow scrofulous enlargement, the anti-scrofulous regimen is to be prescribed; nourishing food, sea-air, tonics, &c. The occasional application of leeches to the neighbourhood of the gland; a succession of small blisters to the forehead, temple and back of the ear; small doses of calomel, or blue pill at night, with a saline or other laxative, next morning, will also prove beneficial. Iodine ought to be tried. If scrofulous inflammation of the gland ends in suppuration, we must not allow the skin to become extensively diseased, but employ the lancet as soon as fluctuation is distinct. If protrusion and disorganization of the eye be threatened, the gland ought to be extirpated.

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[1] Dublin Hospital Reports; Vol. iii. p. 408; Dublin, 1822.

[2] See Daviel's 2d and 3d Cases of Extirpation of the Lacrymal Gland, in the London Medical Gazette; Vol. iii. pp. 523, 524; London, 1829.

SECTION V.—CHRONIC ENLARGEMENT, SCIRRHUS, OR CHLOROMA OF THE LACRYMAL GLAND.

The lacrymal, like other glands of similar structure, is subject to a slow enlargement, which has generally been regarded as scirrhous.

Symptoms. Whatever be the nature of the enlargement, its pro-

gress may be divided into four stages. In the *first*, the patient is affected with epiphora, and complains of burning heat and lancinating pain in the upper and external part of the orbit, but presents as yet, no perceptible swelling in that region. In the *second* stage, the lacrymal gland is so much enlarged that it forms a projecting tumour, which, through the extended skin of the upper eyelid, is felt to be hard and lobulated. In the *third* stage, the gland increases so much, that it pushes the eyeball downwards, inwards, and forwards, from its natural situation in the orbit, till it seems actually to hang upon the cheek. The patient now complains of double vision, dimness of sight, and at length of blindness on the side affected. If the disease be neglected, or the patient refuses to submit to the proper treatment, the *fourth* stage ensues, in the course of which the temporal side of the orbit in some cases begins to be dilated, the eyeball actually resisting the pressure better than the bones; but more commonly the protruded eyeball inflames, swells, suppurates, and bursts; its contents are partly evacuated, partly absorbed; the gland goes on to enlarge till it completely fills and dilates the orbit, the bones of which are sometimes partially removed by progressive absorption, or destroyed by ulcerative inflammation; the lids are greatly expanded and everted; the remains of the eyeball are seen lying on the front of the tumour, which being covered by the distended and inflamed conjunctiva, is apt to be taken for fungus hæmatodes, or some other enlargement of the eye itself; still continuing to grow, the gland presses itself downwards through the spheno-maxillary fissure, obliterates the corresponding nostril, and even deforms the brain; the patient is at length seized with apoplectic symptoms, or dies worn out by pain and fever.

The course of the symptoms varies in different cases. In some, the eyeball is slowly pressed aside, and the orbit dilated, without much inflammatory action. In other cases, violent exophthalmia occurs early, with inflammation of the whole contents of the orbit.

Diagnosis. As several other kinds of tumour, within the orbit, cause protrusion and disorganization of the eyeball, we must carefully examine, whether the lobulated form of the gland be present. After the eyeball bursts, the appearances in cases of chronic enlargement of the lacrymal gland might easily impose on a careless observer for those of fungus hæmatodes of the eye, as may readily be concluded from examining the two figures in Mr Travers' 5th plate; figure 1st representing fungus hæmatodes of the eye, and figure 2d an enlargement of the lacrymal gland.

Nature. It is extremely probable that different kinds of chronic enlargement of the lacrymal gland have been confounded with each other; such as the true scirrhus of old people with the scrofulous enlargement of the young. That the disease which produces the symptoms already described is in all cases scirrhus, may fairly be doubted on the following grounds: 1st, Its attacking children as well as adults; 2d, Its seldom, if ever, affecting the lymphatic system; 3d, Its seldom, if ever, undergoing any thing like cancerous

ulceration; and 4th, Its not returning in the neighbouring parts, after extirpation of the gland. Mr Lawrence tells us, that he had never seen any evidences of malignity in such cases, and seems disposed to think that chronic enlargement of the lacrymal gland is never scirrhous, an opinion to which I cannot subscribe.

Fatal Cases. I shall here mention some particulars of two fatal cases of enlarged lacrymal gland, the one occurring in an elderly person, and the other in a child.

Case 94.—Some years ago, I inspected the body of Mrs F. aged 60 years, a patient of the late Dr G. C. Monteath. She had long been affected with protrusion of the right eye downwards, inwards, and forwards; and some years before her death, the eye had burst. We found the empty sclerotica lying on the front of a tumour, which was white and granular, the grains being evidently the enlarged acini of the lacrymal gland. It was as large as a man's fist, occupying a much expanded orbit, and pressing itself down into the spheno-maxillary fissure. It had been the means of destroying, by absorption, the roof of the orbit, which was still covered by dura mater, except in some few points, where the tumour and the brain were in contact. It had deformed the brain in a remarkable degree, having pressed the lower surface of the anterior lobe of the right hemisphere upwards, and the anterior surface of the middle lobe backwards. The right motor oculi nerve was absorbed. Within the cranium, the right optic nerve was smaller than the left; within the orbit, merely its neurilema remained. The right nostril was obliterated by the presence of the tumour. The frontal and maxillary sinuses on the right side were full of puriform mucus. This patient had all along refused to submit to any operation.

Fig. 11.

Case 95.—I have now before me two greatly enlarged lacrymal glands, which proved the cause of death in a girl of eight years of age, who, from a distance, was brought for advice to the Glasgow Eye Infirmary, on the 17th of December 1830.

It was stated at that time by the parents of the child, that for about five weeks they had observed the left eye protruding from its socket, and for four weeks the right eye also. The disease on both sides had rapidly increased. The cornea of the left eye had already sloughed. The right eye was œdematous, but its power of vision was still considerable. The child complained of sudden attacks of pain in the eyes, but nowhere else. Some discharge of blood had taken place from the right nostril, the day before she was brought to the Infirmary. The patient's appetite was impaired, her bowels costive, her urine scanty, and she slept little. From the Journals of the Infirmary, it appears that iodine, an opiate, laxatives, and blisters behind the ears, were ordered.

On the 24th, the report states the pain to be on the whole diminished. The protrusion of the left eye, however, was increasing. The right cornea was partly ulcerated, the iris inflamed, and the humours muddy. The bowels were more regular, and the urine natural in quantity.

On the 22d of January 1831, the swelling of the left eye is said to have increased; the disease of the right to be stationary, the patient still discerning with this eye light and shadow, the pain gone, no discharge from the nostril, the appetite good, and the sleep natural.

On the 31st, both eyes, it is stated, protruded enormously, the posterior portion of the globe projecting between the lids, and covered by the palpebral conjunctiva in a state of eversion. For two days, the patient had had more pain in the right eye.

After this date, the child was not again brought to the Infirmary. We after-

wards learned, however, that she had continued to experience relief from the opiate at night, so that although often restless, and lying mostly on her face, she never complained of pain. For some weeks before death, she was deaf. About 48 hours before that event, which happened on the 9th of March, there was a good deal of hæmorrhage from the right nostril. She was convulsed about an hour before she expired. She was never comatose nor delirious.

To Mr John Watt, surgeon in Glasgow, I am indebted for the following account of the appearances seen on dissection.

On withdrawing the integuments in the usual way, the bones of the cranium were observed to be here and there of a light green colour. During the process of sawing the cranium, there flowed from the vein which communicates between the integuments and the longitudinal sinus, through the right parietal bone, about four ounces of bloody serum. A number of small tumours were found growing from the dura mater, corresponding to the spots of bone which showed the green appearance above mentioned.

Four small tumours, also growing from the dura mater, each about the size of a shilling, were observed, one over the cribriform plate and crista galli of the ethmoid, one on the petrous portion of each temporal bone, and one at the junction of the lambdoid with the sagittal suture. In all these places, the bones were carious, and the tumours dipped into the carious spots.

A large quantity of serous fluid was effused under the tunica arachnoidea, particularly towards the occiput. The brain was otherwise healthy. There was no appearance of disease about the optic nerves.

On reflecting the integuments over the face, each orbit was found to be occupied by an oval lobulated tumour, nearly $2\frac{1}{2}$ inches in length, and $1\frac{3}{4}$ in thickness. These tumours, which were evidently the enlarged lacrymal glands, adhered firmly to the periosteum, where it is reflected from the os frontis to give support to the upper eyelids, and contents of the orbits. This membrane being cut through, the enlarged glands were easily turned out with the fingers, and dissected from the conjunctiva and integuments.

The tumours, externally smooth, but lobulated, exactly resembled each other in size, texture, and every other particular. They were of a light greenish or whey colour, the exact colour of the tumours of the dura mater already mentioned. They also resembled those tumours in consistence, being of a firm uniform texture, perfectly homogeneous in their interior, and without the least appearance of the whitish bands, characteristic of scirrhus. They not merely completely filled the orbits, but projected about $\frac{3}{4}$ths of an inch beyond the os frontis, pressing forwards the eyeballs, the humours of which had either been absorbed, or evacuated, while their coats were shriveled, dry, and pressed down upon the cheeks. A small tumour of the same greenish colour, and firm texture, was found on the pars plana of the ethmoid bone, in the right orbit, which was also carious, with the tumour dipping into the nose. The hæmorrhage might have been from this, or from the tumour on the cribriform plate.

This case bears considerable resemblance to one related by Mr Allan Burns,[1] in which the lacrymal gland on each side, the lining membrane of the nasal sinuses, and the dura mater, were all affected with the same sort of degeneration. Mr Burns supposes the disease to have been of a specific nature, and one *sui generis;* an opinion in which I am inclined to coincide. The fact that the lacrymal gland is occasionally converted into a morbid structure, of cartilaginous consistence and greenish colour, while the dura mater, periosteum, and Schneiderian membrane give origin to tumours of a similar description, is particularly worthy of attention. Besides the case above related, and Mr Burns's case, two other instances of this disease are recorded, the one by Dr J. H. Balfour,[2] and the other by M. Durand Fardel.[3] In Dr Balfour's case, the eyeballs were protruded and destroyed, and numerous green tumours of the same sort

as those into which the lacrymal glands appear to have been converted, were found attached both to the outside and inside of the skull, and growing from both surfaces of the dura mater. In M. Durand Fardel's case, the lacrymal glands were not affected, but the green tumours were found between the dura mater and the arachnoid, between the bone forming the external meatus of each ear and its lining membrane, in each tympanum, in the spleen, and in the cellular membrane surrounding the rectum. This *chloroma*, or *green tumour*, as it may be termed, presents no whitish bands radiating through it, and is probably different from any of the morbid formations generally recognised by pathologists.

Treatment. In the early stage of enlargement of the lacrymal gland, leeching may be tried, on the same principle which is followed when we endeavour to reduce a suspected scirrhus of the mamma. A succession of blisters may be applied to the forehead and temple. Iodine, and other solvents and sorbefacients, may be used.

If such means are ineffectual in reducing the swelling, extirpation of the gland is the only other resource, and ought to be employed, whether we regard the case as one of simple enlargement, of chloroma, or of scirrhus. It will be in vain to think of extirpating an enlarged lacrymal gland from beneath the upper eyelid, unless the eyelids are first of all disjoined at their outer angle, by an incision carried outwards through the skin, orbicularis palpebrarum and conjunctiva, towards the temple. If this be done, the upper lid may be raised, and the conjunctiva exposed and divided, so as to bring the enlarged gland into view. The mode of extirpation, however, which has generally been adopted, is to cut down directly over the tumour, through the upper eyelid, and parallel to the edge of the orbit. Perhaps two incisions may be necessary, the one parallel to the edge of the orbit, and the other meeting the first at right angles. If the gland is very large, so that it fills the whole orbit, the extirpation may be difficult; and would be more so, were the external incisions small. The gland, being exposed, is to be laid hold of with a hook, dragged forward, cautiously separated from its connexions, and removed. This will be accomplished with more or less difficulty in different cases, according to the degree of adhesion and matting together of the parts, produced by previous inflammation. The eyeball is to be removed, if already destroyed. If entire, it is to be left untouched, whether vision be preserved or not. After the bleeding has ceased, the edges of the wound are to be brought together with two or three stitches, and a few strips of adhesive plaister. Neither is vision nor the position of the eye restored immediately after extirpating the gland. Weeks, or even months, may be requisite before these objects are accomplished; and although the malposition of the eye is always lessened in time, if not entirely removed, vision may never return. The moisture and lubricity of the conjunctiva remaining unaffected after extirpation of the lacrymal gland, has, it is probable, given rise to the statement of some, that the patient continues capable of weeping;

or it is possible, that though the superior portion of the gland had, in such cases, been removed, the glandulæ congregatæ had been left.

Cases of extirpation. Guerin,[4] Warner,[5] and Travers[6] appear to have performed this operation; but the details which they have given on the subject, are comparatively few, and hence an additional degree of interest has attached itself to two cases recorded by Mr Todd and Dr O'Beirne. These, therefore, I shall quote, along with a case by Mr Lawrence, and another by Daviel.

Case 96.—Mr Todd's patient was a woman of 70 years of age. The lacrymal gland formed a large irregular tumour, occupying the upper part of the orbit, projecting more than half an inch beyond the superciliary ridge, and covered by the upper eyelid, which was so stretched upon it as to render the knotty eminences on its surface very conspicuous. The tumour was extremely hard. It was moveable to a slight extent, in a transverse direction only. The globe of the eye was not enlarged, but it had been protruded by the tumour, and was so low upon the cheek that the cornea was nearly on a line with the edge of the ala nasi. The lower eyelid was everted, and appeared dragged down with the globe; the conjunctiva much thickened, and chemosed; the transparency of the cornea slightly obscured. There was no apparent disease of the interior of the eye. Vision was destroyed by the pressure of the tumour. The pains were severe and lancinating, extending from the tumour to the globe of the eye, and were accompanied with a sensation of heat, and a frequent discharge of scalding tears. The sufferings of the patient were most severe at night, and she was almost entirely deprived of sleep; notwithstanding which, her general health was not much impaired, and her appetite was good. She attributed the disease to a blow received on the eye about seven years before; from which period she had been subject to frequent discharges of tears from that eye, but had suffered no other inconvenience until a year before coming under Mr Todd's care, when the tumour began to project under the temporal extremity of the eyebrow. At first, she had no pain or headach; but as the tumour increased, these symptoms set in, and ultimately became so severe that she was anxious to undergo any operation which held out a prospect of relief.

In consultation with Mr Carmichael, Mr Todd determined that an attempt should be made to extirpate the diseased gland alone, and in the event of that being found impracticable, either from extent of attachments, or deep-seated disease, the expediency of removing all the contents of the orbit was fully acceded to; the intense sufferings of the patient, the probable nature of the disease, and the useless state of the eye, appearing to render this an indispensable alternative.

The patient having been placed on her back on a table, with her head a little elevated and secured by the assistants, a transverse incision was made through the integuments, nearly parallel to the superior margin of the orbit, from one extremity of the tumour to the other. Having cut through the orbicularis palpebrarum and the ligamentum tarsi, Mr Todd exposed, by a careful dissection, the entire anterior surface of the gland. Being firmly wedged into the orbit, it was not without difficulty that the handle of the scalpel was introduced between the gland and the superciliary ridge in order to detach it from the orbitary process of the frontal bone. The surface of the gland next the eye was irregularly lobulated, and the lobes had insinuated themselves amongst the muscles and other contents of the orbit, so as to render their disentanglement extremely difficult and hazardous. By cautiously tearing their cellular attachments with the end of the finger, the handle of the knife, and the blunt extremity of a director, and by cutting on the finger with a probe-pointed bistoury some firm membranous bands, which could not be easily broken, Mr Todd succeeded in extracting the entire tumour. On a careful examination, no farther disease could be detected in the orbit, and as no bleeding occurred, the globe of the eye was gently pressed towards its natural situation, the wound dressed, the parts supported with a compress and bandage, and the patient laid in bed, with strong injunctions to observe the strictest quiet.

The extirpated gland was much larger than a walnut. On the surface which had been towards the eye, it presented three considerable eminences or lobes, with deep fissures between them. It was almost as firm as cartilage, and more elastic. A section exposed several small cartilaginous cysts, which contained a glairy fluid, the interspaces consisting of a firm fatty substance, traversed by a few membranous bands.

Two hours after the operation, an alarming hæmorrhage took place, which, from the great depth at which the wounded vessel was situated, and the extensive extravasation of blood into the loose cellular tissue of the orbit, was with difficulty suppressed by pressure with the finger. Dossils of lint were then introduced into the wound, and the bleeding did not recur. The patient passed a tranquil night, and for the first time during many weeks enjoyed refreshing sleep. On the following day, the appearance of the eye and surrounding parts was by no means encouraging. The globe was protruded from the orbit as much as before the operation, by large coagula, which occupied the situation of the tumour; the lids were affected with extensive ecchymosis; they were livid and cold, as if in the state of gangrene; and the cellular tissue of the conjunctiva was distended with effused blood. Notwithstanding these unfavourable appearances, the patient had experienced much relief from the operation; she was free from acute pain, and the constitutional excitement was inconsiderable. In the course of a few days, the coagulated blood contained in the orbit began to dissolve, and suppuration was soon established. The globe of the eye began slowly to return into its natural situation, and the conjunctiva and skin of the eyelids to assume their healthy appearance. On the 12th day after the operation, the improvement in the position of the eye was quite evident; but it was found impossible to prevent the eversion of the lower eyelid, in consequence of a thickened fold of the conjunctiva, which extended between it and the globe. To this fold, the nitrate of silver had been frequently applied without any benefit; Mr Todd therefore removed it by excision, and was immediately enabled to replace the lid, which showed no farther tendency to become everted. From this period, the patient's recovery was uninterrupted, and she was discharged without any return of disease. Vision remained totally lost, the pupil greatly contracted, the position of the eyeball almost natural.[7]

Case 97.—A man, aged 22 years, strong and athletic, came under the care of Dr O'Beirne, with considerable deformity and imperfect vision of the right eye. The globe projected more by its semidiameter than the sound eye, yet it was covered almost entirely by the upper eyelid, which hung loosely over it, as if palsied; the pupil was dilated and insensible to light, the cornea was turned towards the nose, and the puncta lacrymalia were patulous. The upper and outer part of the orbit was occupied by a tumour, the outline of which could not be distinctly traced, but to its growth were attributed the protrusion of the eye and impaired vision. The patient suffered considerable pain of the right side of the head and face, and much irritation and watering of the eye were produced by cold air, or particles of dust. All objects appeared to him double; and in endeavouring to reach any object, his hand or foot generally fell short of it, so much so as to prevent him from working even as a labourer. About two years before coming under Dr O'Beirne's care, he perceived first of all sparks, and occasionally mists, before his eyes, with sharp intermitting pains in the right side of his head and face; in about a year, a slight prominence and inversion of the globe were observed; and from that period, the symptoms gradually proceeded to the state already described.

It was decided in consultation, that the tumour should be removed, but it was not even suspected that the lacrymal gland was the part affected.

The operation was begun by an incision through the integuments of the upper eyelid, extending from the inner to the outer angle. The orbicularis palpebrarum being next divided, some portions of adipose substance which presented were removed. Dr O'Beirne then introduced his finger, and at once discovered that the disease was an enlarged and indurated lacrymal gland. The anterior surface of the tumour was exposed by dissection, and it was finally removed by cautiously working with the nail of the little finger, for it was not considered safe to introduce a knife into the back of the orbit.

The surface of the extirpated gland was granular, and of a pink colour. It was enlarged to at least six times its natural size. When cut into, it presented a hard, membranous, or rather cartilaginous centre, from which septa passed to the circumference. No sanies could be perceived. On the tumour being removed, the pupil instantly recovered its contractile power, and the globe retired nearly to its natural situation. Vision, too, was improved, but not perfectly restored. Scarcely any hæmorrhage ensued, and the wound was dressed simply. With the exception of a slight erysipelas of the scalp, which yielded to the usual remedies, the patient's recovery was uninterrupted, and the wound was completely healed on the 14th day after the operation. At that time, vision was perfect, all uneasiness had subsided, and the eye occupied its proper place. The upper eyelid, however, having continued so much relaxed as to obscure a great part of the cornea, a camel's hair pencil, dipped in sulphuric acid diluted with three parts of water, was applied in the line of the cicatrice. In a few days a slough separated, and the subsequent cicatrization contracted the lid to its natural state. The patient continued perfectly well, and suffered no inconvenience from the loss of the gland.[8]

Case 98.—John Clifton, aged 24, seven years before his admission to the London Ophthalmic Infirmary, received, by an apple thrown at him, a violent blow on the left upper lid, near the external angle of the orbit. This was followed by a considerable swelling, which gradually subsided. Two months afterwards, the lid again swelled, with considerable pain, which lasted for about a month. The pain then went off entirely, but the swelling continued. There was a constant profuse watery discharge, considerably increased by exposure to the air. The globe of the eye became gradually protruded from the orbit, with loss of all useful vision. A fortnight before his admission, the eye inflamed and became very painful. There was general fulness of the upper lid, which was more particularly swelled, and broader than natural, near the external angle. The globe and the lower lid were pushed downwards and inwards to about half way between the orbit and the nose; but although the globe was quite out of its socket, the lids were so extended as to cover it completely. There was considerable inflammation of the external tunics, a broad red zone in the sclerotic round the cornea, with general dulness, and a small ulcer of the latter. A hard unyielding tumour, tuberculated on its surface, projected a little beyond the margin of the orbit, at its upper and outer part. Mr Lawrence thought it doubtful whether or not this tumour was moveable upon the bone. Mr Tyrrell considered it not moveable, and therefore did not recommend its extirpation. The patient was cupped, bled with leeches and purged. Mr Wardrop was consulted, and after convincing himself that the tumour had not any immediate connexion with the bone, he strongly advised its removal by an operation, which Mr Lawrence accordingly performed.

As the swelling obviously filled a large portion of the orbit, and probably extended deeply into that cavity, it was desirable to have ample room, and the external incisions were therefore free. The first, about 3 inches in length, extended from the temple, along the upper lid to the root of the nose; the second, 2 inches long, passed perpendicularly over the upper and outer part of the orbit and forehead, to meet the first at right angles. It was found necessary to make a third incision, from the first towards the anterior part of the zygoma. By turning aside the flaps produced by these incisions, the seat of the tumour was completely exposed. No other difficulty was experienced, except what was inseparable from the size and hardness of the swelling, its deep extent backwards, and close contact with the orbit and its contents; its surrounding connexions were, however, merely cellular.

The tumour consisted of the lacrymal gland, increased to the size of a large walnut, and of the most compact homogeneous structure; having a firmness of texture approaching to that of cartilage, a light yellow tint, and at one part an appearance of white radiating fibres. Altogether it much resembled the firmest part of a scirrhous breast.

During the operation, a large quantity of blood was lost, and, as it filled the deep cavity left by removing the tumour, its source could not be discovered. The patient was left quiet, in the hope that the bleeding would cease; it continued, however, freely, for more than half an hour, rendering the patient very faint.

An artery was then secured. The incisions were approximated by five small silk ligatures, and three narrow slips of adhesive plaister; and the parts were constantly covered with a wet rag. By the following day, the wounds having united by adhesion, the stitches and straps were removed. The eye had already receded to its natural position, and the inflammation of the sclerotic had ceased. Fourteen days afterwards, the cornea had nearly recovered its transparency, vision was much improved, the eye moved freely, and its surface, with that of the lids, was as moist as usual.[9]

A Medical Journal, published at Bourdeaux in January 1829, contains an account of some cases of extirpation of the lacrymal gland, performed many years before, by Daviel. One of these is the following:—

Case 99.—A peasant, 63 years of age, 11 years before he consulted Daviel, had received a blow on the upper part of the right orbit. Fomentations and other remedies were employed; notwithstanding which, the eye became projected from the orbit so as to produce considerable deformity, and its functions were impeded. On careful examination, Daviel discovered a fistulous opening, about a line in width, which penetrated the orbit. By introducing a probe, an extremely hard body was felt between the globe of the eye and the bone, which was likewise discovered to be carious at the upper part of the orbit. A director was introduced into the sinus, and an incision made through the upper eyelid, from the outer and upper angle of the orbit to within the eighth of an inch of the inner and upper angle. By this incision the ball of the eye and the caries of the orbit were exposed, and several pieces of diseased bone removed. Nearly an ounce of grumous matter escaped, which had been contained in a strong cyst. This, as well as the lacrymal gland, was removed. The gland was nearly as large as a pigeon's egg. A small fatty tumour was also taken away; after which the eye was easily restored to its natural situation, and the strabismus, which had been present before the operation, disappeared. The wound was simply dressed, except that little dossils of charpie, dipped in tincture of myrrh and aloes, were applied to those points of bone which were exposed. In less than a month the patient was radically cured, the eye being as moist as the other, and (if the narrator of the case was correct) capable of weeping, as if the lacrymal gland had been present.[10]

Before quitting the subject of this section, I may observe that considerable difficulty is likely to occur in forming a diagnosis between the disease we have just been considering, and that described by Schmidt, under the name of *hydatid of the lacrymal gland*, but which, I am convinced, is nothing more than an encysted tumour closely connected with the gland. The symptoms of encysted tumour in this situation, and also those which attend the same disease occurring in the vicinity of the glandulæ congregatæ and lacrymal ducts, I shall consider in the two following sections.

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[1] Surgical Anatomy of the Head and Neck, p. 385; Glasgow, 1824.

[2] Edinburgh Medical and Surgical Journal; Vol. xliii. p. 319; Edinburgh, 1835.

[3] Journal Hebdomadaire des Progrès des Sciences Médicales; Tome iii. p. 207; Paris, 1836.

[4] Richerand, Nosographie Chirurgicale; Tome ii. p. 31; Paris, 1808.

[5] Cases of Surgery, p. 108; London, 1784.

[6] Synopsis of the Diseases of the Eye, p. 228; London, 1820.

[7] Dublin Hospital Reports; Vol. iii. p. 419; Dublin, 1822.

[8] Ibid. Vol. iii. p. 426.

[9] Lancet; Vol. x. p. 159; London, 1826. Lawrence's Treatise on the Diseases of the Eye, p. 697; London, 1833.

[10] London Medical Gazette; Vol. iii. p. 523; London. 1829.

SECTION VI.—ENCYSTED TUMOUR IN THE LACRYMAL GLAND.

This disease appears to have been for the first time accurately described by Professor Schmidt, under the appellation of *glandula lacrymalis hydatoidea*.[1]

It certainly consists of a collection of thin fluid in the situation of the superior portion of the lacrymal gland. This fluid Schmidt supposed to be tears, and the cyst, in which it collects, to be originally nothing more than one of the cells of the cellular membrane, serving to hold together the acini or grains of which the gland is composed. Whether this is really a lacrymal tumour, or merely a cyst situated in the lacrymal gland, or at least closely connected with it, is, in a practical point of view, a matter, perhaps, of little consequence.

That it is a rare disease may be concluded from the fact, that Schmidt relates only two cases of it; and that even Beer's vast experience had brought only three under his observation.[2] In one of Beer's cases, the diagnosis became completely evident only after death. In the tumour, he found a small quantity of fluid, which he does not hesitate to call tears, and which was thin, clear, and sharp and saltish to the taste. In his second case, he opened the tumour during life; the fluid discharged was yellowish like serum, but so acrid, that it immediately caused a small blister when applied to the tongue. In Beer's third case, he was merely consulted in the commencement of the disease.

Schmidt's own hypothesis of the origin of the cyst is quite inconsistent with the assumption, that this disease is at all analogous to the entozoa, known under the name of hydatids. He supposes that a single cell of the cellular membrane, connecting the acini of the gland, becomes distended, and filled with tears, and that this is the origin of the disease. It is not easy to explain how this cell should afterwards become detached, so as to form a cyst, which may be sometimes extracted, as if quite free from the surrounding parts; for to tell us, as Schmidt has done, that the distended cell presses aside the surrounding cellular membrane, so as to form a sort of capsule for itself, and that between this capsule and the proper membrane of the cell an interstitial fluid is afterwards effused, is to indulge entirely in conjecture.

Symptoms. The development of an encysted tumour in the lacrymal gland is, in some cases at least, very rapid; and its consequences not merely distressing, but dangerous. One of the most striking symptoms attending this tumour, is protrusion of the eye. It is pushed forward from the orbit, and inward, towards the nose. I have already had occasion to mention that protrusion of the eye is called *exophthalmos*, if there is no other change than merely the change of place; but that if there be inflammatory disorganization of the whole globe of the eye, along with the protrusion, this state is called *exophthalmia*.

When the disease produces exophthalmos merely, the following are the symptoms. The patient, perhaps perfectly well in every other respect, complains of obtuse, deep-seated pain in the orbit. The pain is as if something behind the eyeball were pushing it out of its socket. It is felt most when the patient moves his eye in different directions, and especially when he turns it towards the temple. It daily increases. Nothing unnatural in the form or in the texture of the eye or eyelids is as yet discernible. By and by, there is added to the pain behind the eye, a feeling of tension both in the orbit and over the side of the head; and the eyeball is now observed to be somewhat protruded from the orbit and towards the nose. Some few individual blood-vessels excepted, it is not red. The patient has a feeling of dryness in the eye. He cannot move it without great aggravation of the pain, and a sensation of sudden flashes of light. At last, he is totally deprived of the power of moving it. When he regards objects with the protruded eye, he sees them disfigured. If he looks with both eyes, he sees objects double, as the protruded eye stands no longer in the natural axis of vision. The more that the tumour pushes the eyeball out of the orbit, vision becomes the weaker and more disturbed. In proportion as the disease advances, the patient loses his appetite, and is deprived more and more of sleep. The hemicrania becomes uninterrupted, by day and night. Vision is entirely lost. The eye is so much protruded that it rests in some measure upon the cheek. The eyelids lose all power of motion, the upper one being firmly extended over the protruded eye. The patient betrays a constant inclination to cover the eye with the eyelids, and at every attempt to do so the eyeball is rolled by the action of the obliqui towards the nose. A resisting hardness is felt with the finger at the temporal angle of the eye, between the protruded eyeball, and the external edge of the orbit. The eye becomes sullied and dusky. If nothing is done to relieve the symptoms, coma and death are the consequences.

Should the disease produce exophthalmia, besides obtuse, deep-seated, and constantly increasing pain in the orbit, there is pain in the eyeball itself; and whereas, in the former case, the eye, though protruded by the growing tumour, preserves its ordinary size, in the present case it is rapidly enlarged and destroyed by inflammation. It suppurates, and unless opened by the knife, bursts, discharging blood and ichorous matter. The membranes do not collapse after this evacuation, but the eyeball, as a fleshy shapeless mass, continues to protrude from the orbit, proving how much its organization had suffered by the processes of inflammation and suppuration. The pain in the burst eye, and in one side of the head, continues, the patient is deprived of sleep and appetite, and the lymphatic glands about the face become enlarged. Should a patient present himself with such symptoms, we shall naturally be led to suspect the existence either of this disease, or of some other disease of the lacrymal gland, and our suspicions will be confirmed if we find a resisting

hardness between the destroyed eyeball and the external edge of the orbit. It is likely, however, that this may be detected at a much earlier period of the disease.

Could we dare to draw conclusions from the few cases of this disease on record, we should say that it is more apt to terminate fatally when attended by exophthalmos, than when accompanied by exophthalmia. In neglected cases, however, of encysted tumour in the lacrymal gland, attended by exophthalmia, the disorganization is apt to spread to the bones of the orbit, and at last the brain itself becoming affected, death puts an end to the patient's sufferings. This was the termination of one of the three cases observed by Beer.

Treatment. The radical cure of encysted tumour in the lacrymal gland, would consist, no doubt, in extirpating the tumour, before the eye became protruded, at least to any considerable extent, from the orbit; but at this period, we cannot distinguish the disease with sufficient certainty. Even had we the means of determining that the commencing exophthalmos arose from the cause in question, could we extirpate this vesicular swelling without removing also the gland in which it is situated, or with which it is intimately connected?

A palliative treatment, it is probable, will generally be adopted, by the employment of which we may save both the life, and the eye of the patient. It may even happen that by the early employment of this palliative cure, we may be fortunate enough to cure the disease completely. No hope of this, however, need be entertained, if the eyeball be already protruded from the orbit, the power of vision lost, the eyeball beginning to appear dusky and lifeless, or if it be violently inflamed, and in part disorganized.

The palliative cure consists in puncturing the tumour, and evacuating the accumulated fluid. This should be done, if practicable, from under the upper eyelid, with a lancet or small concealed bistoury, directed towards the seat of the lacrymal gland. Should the tumour return after the healing of the wound, the operation must be repeated. I should think any attempt to keep the wound open, and the tumour constantly empty, by the introduction of a bougie or other foreign body, out of the question, if the incision were made from under the upper eyelid. But if the protrusion of the eye were such that the upper eyelid should be firmly stretched over the eyeball, and that no instrument could be passed between them, the tumour would require to be opened through the upper eyelid, and the wound might be afterwards kept open by a bit of catgut, so as to give exit to any reaccumulated fluid, and perhaps produce a radical cure.

That through the opening, wherever it be made, the cyst of the tumour shall be extracted, cannot be regarded as very likely; yet this actually took place in one of Schmidt's cases.

As the present is a rare and interesting disease, I am induced to lay before the reader the particulars of the following cases:—

Case 100.—A private soldier, aged 26 years, of a firm and corpulent make, became ill with fever, from fatigue and exposure to cold, in the end of November 1800. According to the history of the case, he had a slight typhus, which yielded to the use of the proper means, so that he left the hospital in the beginning of January 1801, and set off for his regiment. Some days before he left the hospital, he had an obtuse, deep-seated feeling of pressure in his eye; but he set himself out against it, and said nothing of it to his medical attendant. He was about eight days with his regiment, when he observed that this obtuse, deep-seated pain grew more constant and more troublesome. But as he could discover nothing wrong about his eye, and saw perfectly well, he let matters rest as they were. In the beginning of the third week, the feeling of pressure became violent, he felt pain with tension in the eye itself, and in the corresponding half of the head; the eye became red and dry, and began to project; he frequently had the sensation of fiery spectra, and at times his sight failed him. About this time his sleep became interrupted. With these symptoms, he was unable to perform his duty as a soldier. The medical officer to whom he was presented, ordered the application of a moist warm poultice. The case became evidently worse from day to day. With the beginning of the fourth week, the hemicrania and pain in the eye became furious, day and night, so that he could not get a moment's sleep; the eye protruded completely from its socket, so that it was seen from the other side over the root of the nose; it was slightly red, but not swoln, moist and slippery, but deprived of sight. The appetite for food, which had continued till now, was lost. The patient's restlessness rose to the extreme.

In this state he was brought to the Military Hospital of Vienna, on the 4th February. Early on the 5th, Schmidt saw him for the first time. Besides the above-mentioned symptoms, he found the patient affected with spasm of the superior oblique muscle, whereby the eye was every instant drawn more out of the orbit, and towards the nose. The eyelids were not in the least swoln, but quite pushed aside from the eye. Schmidt felt distinctly a resisting hardness in the temporal angle of the orbit. He declared before those who attended the visit, that the disease was seated in the orbit, and that it was probably a steatomatous tumour. Opium internally and externally, warm poultices over the eye and head, nothing checked the fury of the pain. Early on the 6th, Schmidt found the patient in the same state, only that the eye was no longer lively, but dusky and somewhat like the eye of a dying person, while the appearance of the sound eye was still very lively. The pulse, the respiration, and all the other functions, were not in the least altered. Schmidt determined to evacuate the eye, next day, by an incision. Towards evening, the patient fell into a state of sopor, became insensible, discharged his urine and fæces involuntarily, and died towards midnight.

On dissection, the veins and sinuses of the brain were found distended with blood. There was no accumulation of fluid in the ventricles. On removing the orbitary process of the frontal bone without injuring the periosteum, a fluctuating tumour pressed itself upwards from the temporal angle of the orbit. On continuing the dissection, the muscles of the eye, the optic nerve, and the other nerves of the orbit, were observed to be stretched and elongated, and the ophthalmic vein appeared varicose. The lacrymal gland was smaller than usual, and in connexion with it lay the fluctuating tumour. The individual acini which were more remote from the tumour, and were directed towards the upper eyelid, were larger and more coherent; whilst those acini which lay upon the tumour were small, and both appeared and felt more loosely scattered than natural. The tumour was in diameter, from behind forwards, the length of an inch; in transverse and perpendicular diameters somewhat less than an inch. It pressed itself close upon the external segment of the eyeball, and even after death held the eyeball out of the orbit and towards the nose. It had an external and an internal covering. The external consisted of thick cellular membrane. Between this and the internal covering, was a quantity of interstitial fluid. The internal covering was very fine, semitransparent, and contained a limpid fluid. The external membrane could not be easily separated from the scattered acini of the lacrymal gland. The internal could be freely extracted from the external covering.[3]

Case 101.—A young country-woman came to Vienna in May 1802, and sought Schmidt's assistance. She had weaned her child two months before; and immediately after that, upon being exposed to cold, felt violent hemicrania and pain in the eye. After some days the eyeball inflamed severely, became swoln, and pressed itself forwards from the orbit. When the woman came to Schmidt, the inflamed eye had the size of a man's fist, the cornea was completely destroyed from suppuration, and the iris was covered by a new and wartlike production, so that it was with difficulty that an eye could be recognised in this shapeless mass of flesh. Together with a constant pressing pain in the orbit, and continual hemicrania, Schimdt found all the symptoms detailed in the former case, with the exception of the spasmodic motions of the eyeball. He mentions that the parotid gland, upon the same side, was swoln towards the branch of the lower jaw, but more probably the swelling affected one of the lymphatic glands lying over the parotid.

The patient was admitted into the hospital, under the care of Mr Ruttorffer, who passed a small flat trocar under the upper eyelid, directing its point towards the fossa lacrymalis, where the resistance and hardness were felt. More than an ounce of extremely clear fluid was immediately discharged through the canula. The canula was removed, and for several days this clear fluid issued from the wound. Some hours after the operation, the hemicrania suddenly and considerably diminished, and from day to day the exophthalmia became less.

On the 14th day after the operation, a whitish streak was observed in the wound, resembling pus, but which could not be removed with a little lint. Mr Ruttorffer laid hold of this with a pair of forceps, and drew forth the cyst, or, as Schmidt chooses to call it, the hydatid, which, as represented in his work, must have measured more than an inch in diameter. After other 14 days, the woman left the hospital, the eye having diminished to a small stump.[4]

From the state to which the eyeball is reduced in exophthalmia proceeding from this disease, it is not unlikely that cases of this sort have sometimes been taken for cancerous affections, and the eyeball extirpated with the cyst. An instance of this kind we find in the Philosophical Transactions for 1755, related by Mr Spry, surgeon at Plymouth.

Case 102.—A mariner's wife complained of violent pain in her left eye, and sometimes of very acute pain in the temple of the same side, with some defect in her sight. She also imagined that her eye was bigger than ordinary; but, upon inspection, it appeared no bigger than the other. The cornea, however, became less transparent, and the pupil greatly dilated. The vessels of the conjunctiva and sclerotica were no way enlarged. Bleeding, blistering, and purging, proved of no effect. On the contrary, the cornea became more opaque, great inflammation of the conjunctiva and sclerotica ensued, and an apparent prominence of the whole eye. She was again purged, and a seton put in the neck; but the symptoms increased. She became still more miserable. The conjunctiva became greatly inflamed, with eversion of the upper lid, attended with great pain. Mr Spry often scarified the conjunctiva, which bled plentifully, and gave her ease for a day or two. He also took blood from the temporal artery. But the eye being greatly enlarged, and of so terrible an appearance, after all his endeavours for eight or ten months, he judged the disease to be carcinoma, and therefore proposed cutting out the eye as the only remedy. The operation, however, was deferred; till at length, the eye becoming much larger, and the pain increasing, extirpation was had recourse to, lest the bones of the orbit might become carious.

Mr Spry having begun his incision round the upper part of the tumour, had not cut deep, when a great quantity of fluid, like lymph, poured out upon him with great force, like a fountain. The tumour subsided a good deal; but pursuing the operation, he found a large cyst, which filled the whole orbit behind the eye. A part of this cyst was left to slough off with the dressings. The whole eye being cut out, he filled the wound with lint. The cure went on with success, and was complete in a month.

On examining the tumour which had been removed, the eye appeared a little

bigger than natural, the aqueous humour not so clear as usual, the crystalline less solid and transparent, the vitreous almost reduced to a liquid state, the cyst very strong and elastic, with a cavity sufficient to contain a large hen's-egg.

There can be little doubt that this was a misunderstood case of encysted tumour in the lacrymal gland, or, at any rate, of encysted orbital tumour, and not at all a carcinoma.

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[1] Ueber die Krankheiten des Thränenorgans, p. 73; Wien, 1803.
[2] Lehre von den Augenkrankheiten; Vol. ii. p. 597; Wien, 1817.
[3] Op. Cit. p. 90.
[4] Ibid. p. 94.
[5] Philosophical Transactions; Vol. xlix. Part I. p. 18; London, 1756.

SECTION VII.—ENCYSTED TUMOUR IN THE VICINITY OF THE GLANDULÆ CONGREGATÆ AND LACRYMAL DUCTS.

The subject of this section resembles considerably in its nature the disease which we have last considered. Its seat seems to be the principal difference; for the tumour described in the last section is seated in the substance of the superior portion of the lacrymal gland, and is supposed by the German ophthalmologists to derive the fluid which it contains from the gland immediately; while the present disease, is seated almost immediately behind the conjunctiva, in the vicinity of the glandulæ congregatæ, and derives its fluid according to Schmidt,[1] from one or more of the lacrymal ducts. Benedict[2] describes it as a mere dilatation of one of these ducts. Encysted tumour in the lacrymal gland, produces a series of dangerous symptoms, long before it comes into view itself, if ever it comes into view; whereas, a similar tumour in the vicinity of the glandulæ congregatæ and lacrymal ducts, from its superficial situation, is neither productive of so destructive effects, nor can it remain so long concealed.

Symptoms. As soon as it has reached any considerable extent, the present disease manifests itself by the following symptoms. A circumscribed, very elastic swelling, void of pain, is felt immediately behind the upper eyelid, towards the temporal side of the orbit. If the tumour has already reached such a degree, as to present through the eyelid the size of a hazel nut, and if we press upon it pretty forcibly, the patient feels the pressure in the eyeball, and observes fiery spectra before the eye. If, at the same time that we press the tumour from without, we raise the upper eyelid, and, in some measure, evert it, we see the conjunctiva project in the form of a distended sac, in which we discover fluctuation. When the tumour has reached the size of a pigeon's egg, the motions of the eyeball upwards and outwards are impeded; yet, when we raise the upper eyelid in the manner just now mentioned, the patient is immediately able to move his eye, without difficulty, towards the temple, the eyeball retiring behind the tumour, pushing it and the conjunctiva still more for-

wards, while at the same time the fluctuation becomes more distinct. From extreme distension, the conjunctiva, and the cyst in which the fluid is contained, are so thin, that the pressure we employ in examining the disease, seems almost sufficient to cause the rupture of the tumour. In no other affection of the orbit, or of the eyelids, do we observe any similar symptoms. One of the most characteristic marks of this disease, we are told, is the momentary increase of the tumour when the patient weeps.

Causes. It is supposed that the proximate cause is one or more of the excreting ducts of the lacrymal gland terminating in the loose cellular substance under the conjunctiva; that one of the cells is gradually distended by the accumulating tears, and at last forms the thin sac, the projection of which gives rise to the symptoms described. That this is the real nature of the case, is concluded from the alleged fact, that if the tumour be opened through the eyelid, a considerable quantity of pure tears flows through the incision, every time the patient weeps. I must confess that I have no faith in this etiology.

Beer[3] met with this disease six times in individuals who were between four and fourteen years of age. In two of these cases, an apparent exciting cause had preceded the disease. In the one, the cause was a violent bruise on the upper edge of the orbit, from the springing of a billiard ball. In the other, it arose after the incomplete extirpation of an encysted tumour, which had its seat at the same place.

Treatment. The plan of cure which appears the most rational, is to evert the upper eyelid, or if that cannot be done to a sufficient extent, to separate the eyelids by an incision, carried outwards from their external angle towards the temple, and then, raising the upper lid, to expose the tumour, divide the conjunctiva very cautiously, lay hold of the cyst with a pair of forceps, and extirpate as much of it as possible.

Beer's treatment consisted in laying bare the tumour by a division of the conjunctiva, and then passing a thick silk thread through the cyst, and through the upper eyelid, by means of a curved needle, knotting together the ends of this seton, and drawing it backwards and forwards till such a degree of inflammation should be excited as was likely to obliterate the cavity of the cyst. If, after 24 hours, this seemed insufficient to cause the necessary degree of inflammation, he moistened that part of the seton which issued from the eyelid with a solution of lunar caustic, or even of pure potash. Still, if no sufficient adhesive inflammation followed, nor any suppuration sufficient to destroy the cyst, or even to destroy the excretory duct supposed to be in fault, he contented himself with having in this way obtained a palliative cure. He still retained the seton for a time, till the internal and external openings became callous, in the hope that, after the thread was withdrawn, the patient might be able to empty the cyst by gentle pressure, whenever it should become filled. He mentions, that if the evacuation takes place through the external opening, the collected fluid is squirted

out in a scarcely visible stream, through the minute fistulous opening, to the distance of several feet, till the tumour be emptied.

It strikes me that rather than form in this way a troublesome fistulous opening through the upper eyelid, the simpler palliative cure should be had recourse to, of puncturing the tumour, through the conjunctiva; but that it would be preferable, to endeavour radically to remove the disease, by extirpating the cyst in the manner already mentioned.

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[1] Ueber die Krankheiten des Thränenorgans, p. 63; Wien, 1803.
[2] Handbuch der praktischen Augenheilkunde; Vol. iii. p. 163; Leipzig, 1824.
[3] Lehre von den Augenkrankheiten; Vol. ii. p. 593; Wien, 1817.

SECTION VIII.—TRUE LACRYMAL FISTULA.

A callous opening, sometimes so small as scarcely to be visible to the naked eye, situated in the upper eyelid, towards its temporal extremity, and from which there trickles from time to time a quantity of tears, is styled a true lacrymal fistula. If we pass an Anelian probe into the minute orifice, we find that the probe is led directly towards the lacrymal gland, but we neither perceive any hardness of the gland, feel any portion of bone laid bare, nor give the patient any pain.

True lacrymal fistula may arise from a wound of the superior portion of the lacrymal gland, and still more readily from a wound of the glandulæ congregatæ, or of the lacrymal ducts. More frequently it is the effect of a neglected or mistreated abscess of the upper eyelid, or of inflammation which had passed into suppuration, of the cellular substance surrounding the lacrymal gland. It may also be the result of attempts to extirpate an encysted tumour in the vicinity of the lacrymal ducts, or to cure that disease by means of a seton.

This almost capillary fistula will require the finest Anelian syringe, to inject any fluid into it. It has been advised to widen the fistula, by repeated introductions of the Anelian probe, followed by the use of a piece of catgut, or at once with the knife; and, after this is accomplished, to introduce a small bougie armed with lunar caustic. By passing the bougie backwards and forwards several times with a rotatory motion, through the fistula, we may expect to excite such a degree of inflammation as shall end in its closure.

A stout country lad had a fistula of this kind, $3\frac{1}{2}$ lines deep, and completely callous. Beer quickly passed into the opening, and to the bottom of the fistula, a red hot knitting needle, turning it round several times upon its axis. Five days afterwards, the fistula was completely closed.[1]

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[1] Lehre von den Augenkrankheiten; Vol. ii. p. 186; Wien, 1817.

SECTION IX.—MORBID TEARS.

The tears are at all times an irritating secretion. The conjunctiva is instantly reddened when they flow; and although we were to grant that this was consentaneous with the determination of blood to the lacrymal gland, preceding the discharge, yet we observe that if the tears are so profuse as to run over on the cheek, the skin with which they come into frequent contact becomes inflamed and excoriated. In some cases, the extraordinary degree of inflammation which the tears have excited, has led to the supposition, that their chemical properties were changed by disease, so that they had acquired an unusual degree of acridness. In a supposed case of this kind, which some years ago attracted a considerable share of attention in Glasgow, it was discovered, that the deep lines of excoriation which ran down the cheeks of the patient, who was a child, were not the work of the tears, but the effects of a deliberate application of sulphuric acid. The author of this extraordinary piece of cruelty, was the woman who kept the child.

SECTION X.—SANGUINEOUS LACRYMATION. HÆMORRHAGY FROM THE LACRYMAL GLAND.

Dr Clopton Havers relates the case of an icterical discontented woman, who, having a desire to die, wholly rejected the help of medicine. Being well nigh her end, there happened an eruption of blood out of the glandula lacrymalis of one of her eyes, without any external injury. There was an evacuation of 2 pounds of blood, within the space of 30 hours. About a week after, the same sluice was opened again, and she bled till she died.[1]

Professor Rosas refers[2] us to a case of this sort related by Dodonæus, and to another by Lanzoni. In the former instance, the disease accompanied suppressed menstruation; in the latter, it occurred in a lad of 12 years of age, who soon after died of malignant fever.

Professor Rosas himself witnessed this disease in a child of nine years of age, of scorbutic diathesis, and in whom it yielded to antiscorbutic treatment.

It is doubtful, in all these cases, how far the discharge of blood was really from the lacrymal gland, and not from the conjunctiva.

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[1] Philosophical Transactions, No. 208. Lowthorp's Abridgment; Vol. iii. part i. p. 252; London, 1716.

[2] Handbuch der Augenheilkunde; Vol. ii. p. 347; Wien, 1830.

SECTION XI.—LACRYMAL CALCULUS.

The tears, like the saliva, are occasionally the source of calcareous depositions.[1]

Lacrymal calculus does not appear to have been met with, obstructing the ducts of the lacrymal gland; but several cases are recorded, of depositions of calcareous matter from the tears, the concretions being found in the sinuses of the conjunctiva.

Case 103.—In 1811, a small bit of lime fell from the ceiling of a room into the left eye of a healthy young woman. Professor Walther removed the foreign body, and the eye appeared to have sustained no injury. In February 1813, the patient was first attacked with severe toothach, both in the upper and lower jaw. Several decayed molares, in which the pain was particularly violent, were extracted, but with merely temporary relief. Soon after this, she had an attack of rather obstinate constipation, with other symptoms of colic; but by clysters, fomentations, &c. it was removed. Towards the end of July of the same year, she began to complain of a burning, stinging sensation in the left eye, most severe when the eye or eyelids were moved, or when she was exposed to bright sunshine. On closely examining the organ, a white angular concretion was discovered between the eyeball and the lower eyelid, towards the external angle of the eye. It was about the size of a pea, and, when removed from the eye, was readily rubbed down between the fingers into a greasy sandy powder. Although the patient firmly denied that any foreign body had fallen into her eye, Walther at first supposed, that the substance removed was a piece of lime which had just got into it. He was not a little surprised, however, when the patient returned to him, three days afterwards, with a calculus exactly like the first, lying in the very same place. The eye was now considerably inflamed, the pain not being confined to the eyeball, but extending in the direction of the supra-orbitary nerve. There was a proportionate sensibility to light, and increased flow of tears. The inflammation of the eye had commenced the preceding evening, accompanied by a violent paroxysm of fever, with shivering, succeeded by heat. Although the newly-formed calculus was immediately and easily removed, still, on the following morning, after a restless and distressful night, the violence of the inflammation was much increased, and in the lower fold of the conjunctiva another white crumbling concretion was perceived, which, by the succeeding day, had attained as large a size as the former. The upper eyelid was inflamed, and the margins of both swoln. The inflammation was so violent as to require blood-letting, and other antiphlogistic remedies. By these, some alleviation was effected, but four days afterwards another bleeding was necessary, from an increase of the inflammatory symptoms. In the meantime, the formation of calculi, at the same place in the affected eye, not only proceeded, but larger concretions were produced, and with greater rapidity. The calculi were now removed twice a-day, and at length three times a-day, from the eye.

Reasoning from the good effects of potash in calculous affections of the kidney, Walther prescribed a solution of a drachm and a half of carbonate of potash in 4 ounces of cinnamon water, with half an ounce of syrup. Of this solution, half a tablespoonful was taken four times a-day; and along with this, the patient drank copiously of an infusion of the viola tricolor. After using these remedies for six days, during which time the urine was muddy and fœtid, and deposited a copious sediment, the activity of the disposition to form calculi greatly diminished. In the course of 24 hours, there was but one small concretion formed, and at length merely a white crumbling powder, no longer consolidated into a mass, and which required to be removed only every second day. But while the disease in the left eye decreased and disappeared, it attacked the right, and at the same part of the conjunctiva, between the eyeball, and lower eyelid. Its course here was exactly the same as before; at first, the calculi formed in fewer numbers, and more slowly, afterwards more rapidly, and in greater numbers; the inflammation of the right eye was at first moderate, and afterwards more severe, rendering repeated venesection necessary. Nevertheless, the disease never attained the same height, and

was of shorter duration than in the left eye. It gradually decreased as it had increased; the concretions appearing at longer intervals, becoming smaller, and at length entirely ceasing. The whole course of the disease occupied nearly 10 weeks.

The patient's chest seemed to suffer in some degree, from the repeated blood-letting, altered manner of life, and perhaps from the continued use of alkaline medicine; she had a troublesome cough, with considerable expectoration, particularly in the morning, and an altered appearance. Walther, therefore, ordered her an infusion of lichen Islandicus, and better diet. In three weeks, she had perfectly recovered.

Some years after this, however, she was again attacked with the same disease. Concretions of the former colour, size, and other properties, formed in the left eye; at first, they lay between the eyeball and under eyelid, and afterwards between the eyeball and upper eyelid. In the course of a few days, the formation of calculi began in the right eye. On this occasion, both eyes were less severely inflamed, and the disease was likewise of shorter duration. Walther immediately ordered her the solution of potash. The number of calculi which were daily generated soon diminished, and the whole process ceased in shorter time.

On analysis, the concretions were found to be composed of carbonate of lime, which formed the greatest part of their weight; traces of phosphate of lime; and coagulable lymph or albumen. They consequently resembled salivary calculi, and the tartar deposited on the teeth.[2]

Case 104.—Ann Clarke, aged 19, had been in a bad state of health for some months, and frequently complained of a severe pain in the head, particularly across the forehead, and over the left eye, for which she had been bled in the arm, and had leeches applied to the temples, but without permanent relief.

On the 22d December 1834, inflammation came on suddenly in the left eye, attended with a good deal of pain; this increased on the following day, and towards the afternoon she felt a most severe lancinating pain in the upper and outer part of the orbit, accompanied with a sudden and profuse discharge of tears; immediately after which she perceived something in her eye, which, on removing, she found to be a small hard body, resembling a fragment of mortar. At first she supposed it to be some extraneous substance which had accidentally fallen into her eye; but in the course of an hour, the pain, which had remitted on the removal of this mass, returned, and another exactly similar came away. During the three or four following days, as many as 23 were discharged, with the same symptoms; after which the pain and inflammation gradually abated. During the time that these bodies were escaping, there was no bleeding or purulent discharge. On the day following the removal of the last of them, there were slight appearances of conjunctival inflammation; but on everting the upper eyelid, no ulceration or other lesion of the mucous membrane could be perceived there, or on the other parts of the eye. She complained of slight tenderness or pressure in the situation of the lacrymal gland.

Some of the calculi, which had been preserved, were small, rough, very hard, and of a dirty white colour; the largest about a line in diameter. On being viewed with a microscope, they looked like rough pieces of chalk, with small portions of silex imbedded in them. On analysis, they were found to consist principally of phosphate of lime, with a small quantity of carbonate of lime, and traces of animal matter.

The narrator of the case thinks it probable that the calculi were lodged, in the first instance, in the lacrymal ducts, and that producing much irritation there, they were discharged with a gush of tears.[3]

The concretions thus deposited from the tears, Walther proposes to call *dacryolites*. Similar concretions occur in the excreting lacrymal passages, as I shall explain more fully in Chapter VI.

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[1] Guérin, Traité sur les Maladies des Yeux, p. 40; Lyon, 1770.

[2] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. i. p. 163; Berlin, 1820.

[3] London Medical Gazette; Vol. xv. p. 628; London, 1835.

CHAPTER III.

DISEASES OF THE EYEBROW AND EYELIDS.

SECTION I.—INJURIES OF THE EYEBROW AND EYELIDS.

Contusions, wounds, and burns of the eyebrow and eyelids, even in cases where they at first appear trifling, are often productive of very serious consequences. I have already had occasion to mention inflammation of the periosteum, and of the bones, as an effect which is sometimes unexpectedly produced by blows on the edge of the orbit. Lagophthalmos and ectropium are apt to be the disagreeable consequences of neglected burns and abscesses of the eyelids; while incised and lacerated wounds of the eyebrow and of the neighbouring integuments, even of very small extent, are occasionally followed by complete, and too often incurable, deprivation of sight.

§ 1. *Contusion and Ecchymosis.*

Blows or falls upon the edge of the orbit, even when slight, are apt to be followed by extravasation of blood into the loose cellular membrane of the eyelids. The extravasation or ecchymosis seldom makes its appearance immediately after the blow. Five or six hours sometimes elapse before the swoln eyelid assumes the livid colour, denoting the rupture of blood-vessels and subcutaneous effusion of blood. In other instances, however, the ecchymosis is sudden; and the quantity of blood being considerable, a degree of fluctuation is felt in the swoln lid. In pugilistic contests, the eyes are completely closed from the swoln and ecchymosed state of the lids, but the seconds make an opening in the skin with a lancet, and squeeze out the blood, so as to enable the combatant to see his way a little longer.[1] It sometimes happens, that also the subconjunctival cellular membrane is ecchymosed, and occasionally the effused blood stretches back into the orbit, and even protrudes the eyeball. It very rarely happens that the blood effused into the eyelids operates as a foreign substance, or excites inflammation.

Ecchymosis sometimes presents itself, not merely immediately around the part struck, but in other places, more or less remote. Thus Dr Ammon relates[2] a case of contusion with a foil in the vicinity of the right caruncula lacrymalis, with profuse ecchymosis, protrusion of the eyeball, and concussion of the brain. On the third day after the accident, an ecchymosis appeared on the left

side, in the very situation, and to the same extent as that on the right. He calls this a *sympathetic ecchymosis;* and could trace no communication from the right side to the left, over the nose or forehead. Some months after the injury, the right eye became amaurotic.

Under ordinary circumstances, the blood in ecchymosis of the eyelids is generally absorbed in the course of from 14 to 20 days, the swelling subsiding, and the skin gradually losing its livid colour as the absorption goes on, becoming first brownish, and then yellow.

In cases of bruise and ecchymosis of the eyelids, we must endeavour to prevent or abate the inflammation, and promote the absorption of the effused blood.

The first of these objects is to be obtained by the application of leeches, followed by the continued use of evaporating and slightly astringent lotions. More powerful astringents, and gentle pressure are employed to accomplish the second.

To remove a *black eye*, as it is termed, quickly, is the great desideratum with the patient, who often visits us late in the evening, with a woful dread of what his appearance must be next morning, unless we have some application which can prevent or remove the discoloration; but this, in reality, is an inferior consideration.

If the blow has been severe, there can be no question that leeching is the proper mode of treatment. When the patient is a scrofulous child, the application of leeches is imperatively called for, not indeed so much for the removal of the ecchymosis, as for preventing inflammation of the periosteum and bones.

If the blow has been slight, and the patient is a robust adult, compresses wet with an evaporating lotion, may be applied, and kept in close contact with the skin, by means of a roller going round the head. Fomentations with hot spirits are sometimes used, and appear to do good. A popular remedy is a cataplasm of the bruised roots of the convallaria multiflora or Solomon's seal. The roots are beat into a pultaceous mass in a mortar, and are reapplied every half hour for three or four hours, or longer if necessary. They cause a degree of redness and œdematous swelling, and have been supposed to act by means of the œdema which they excite, diluting the effused blood, and thus promoting its absorption. If long continued, they produce too much inflammation; and if the skin be abraded, they are too irritating to be applied at all.

Whatever application we make choice of, whether a solution of muriate of ammonia, a spirituous fomentation, or a cataplasm of convallaria roots, the patient ought to be directed to keep the eyelids at rest, and to maintain a certain degree of pressure on them by means of wet folds of linen, or the cataplasm. Motion of the lids appears to throw the effused blood more into their loose cellular substance, while rest and gentle pressure tend both to prevent this, and to promote absorption.

After the swelling has subsided, those who are obliged to appear in public sometimes contrive to paint the skin from day to day, till the natural colour is restored.

§ 2. *Poisoned Wounds.*

The eyelids are apt to suffer from the stings of bees, wasps, gnats, &c. From the poisonous principle infused into the wound, the stings of those insects sometimes produce severe irritation and inflammation; and the effects are generally aggravated if the sting is left in the wound. If we allow ourselves without resistance to be stung by a wasp or a bee, the insect gradually disengages the sting, without breaking it. The sting is flexible, and the wound is curved or in a zigzag direction. If we drive the insect away, the sting is caught in the wound, breaks off, and is left behind.[3]

The result, if there is only one wound, is a circumscribed, inflammatory, or erysipelatous swelling, sometimes ending in a small slough. If there are many punctures, the reaction may extend beyond the eye and eyelids. Dr Rognetta refers,[4] as to a well known fact, to the case of an unfortunate postillion, who having overturned a bee-hive by an accidental stroke of his whip, was so stung about the eyelids and rest of his face, that his head swelled prodigiously, fever with delirium ensued, and he died in a few days.

The treatment in ordinary cases consists in extracting the sting, and applying some refrigerant and astringent lotion, as vinegar and water, or a solution of muriate of ammonia.

§ 3. *Burns and Scalds.*

Burns and scalds of the eyelids present many shades of severity, depending on the nature of the medium by which the heat is applied, and the length of time during which the parts are exposed to its influence.

For example, in cases of exposure to common flame, the eyelids have time forcibly to close, so that only a very small portion of the eyelashes is left unprotected. Common flame, then, singes in general merely the ends of the eyelashes, and scarcely ever touches the eyeball.

When gunpowder takes fire, and burns the eyelids, the flame being so sudden and expansive, the lids do not close in time, and the eyelashes, along with the eyebrows, are generally completely burnt off, and often the conjunctiva, or the cornea, is also injured. When unconfined gunpowder takes fire, there is generally no propulsion of its particles, but grain after grain ignites, and is consumed, burning of course the lids, or any other part exposed to their influence. When confined, as in a flask, the particles of gunpowder, on the contrary, are driven about unexploded, and fix in the skin of the lids, in the conjunctiva, or in the cornea.[5]

If hot water, or some caustic fluid, is the offending cause, much will depend on the temperature of the former, and on the degree of concentration of the latter.

A person falling down in an epileptic fit, perhaps brings the eyelids into merely momentary contact with the ribs of the grate; or, on the contrary, remains insensible for a considerable time, lying

in contact with the fire, so that a large portion of the integuments of the face is disorganized, and that so deeply, that on the eschar separating, the bones are exposed.

All cases of burns and scalds of the eyelids should be treated with particular care; for, there is, on the one hand, the danger of anchyloblepharon, or union of the edges of the lids, and on the other, of lagophthalmos and ectropium.

It is chiefly in cases of scalds from boiling water, and other hot or caustic fluids, as sulphuric acid, in which the cuticle covering the edges of the lids has been detached, and the patient afterwards allowed, from carelessness, to lie for a length of time with the lids shut, that anchyloblepharon follows. It may always be prevented, by obliging the patient to open his eyes frequently, and introducing, along their edges, a little unguentum oxidi zinci, or other mild salve, melted on the point of the finger. Symblepharon, or union of the lids to the eyeball, is sometimes produced, when the conjunctiva has been injured by the burn or scald. Its prevention should be attempted in a similar way.

Burns and scalds of the external surface of the lids, which have not been sufficiently severe to produce a separation of the cuticle, much less to destroy the texture of the cutis, require merely to be kept constantly wet, for 24 hours, by means of a fold of linen dipped in a mixture of vinegar and tepid water. The same application is also, I conceive, the best, in cases in which the skin is blistered; only, that as soon as the blister has fairly formed, it ought to be punctured with a needle, to let its contents escape. After the first 24 hours, a piece of soft linen, spread with simple cerate, is to be applied.

Burns so severe as to destroy the texture of the cutis, heal only by a slow process of granulation and cicatrization. The granulations, upon which the new skin is formed, are afterwards absorbed, so that a great degree of contraction is produced; and if the eyelids are involved in the cicatrice, they are shortened or everted. This happens more frequently to the lower than to the upper lid, while in some cases of destruction of the skin stretching from the outer angle of the eye towards the temple, we find, after the burn has healed, that both lids are dragged outwards, and their internal surface exposed. One of the worst cases of eversion of the lids, from a burn, which I have seen, was consequent to total destruction of a large portion of the skin of the face, occasioned by a child falling against the fire. The lobe of the ear was lost, the cicatrice was very extensive, and both lids were everted, and dragged towards the temple. In such a case, it is impossible to prevent altogether the displacement of the lids, attendant on the contraction of the cicatrice. In cases of burning of the eyelids from the individual falling upon the fire, where the destruction of parts is such that little else is left than cartilage and conjunctiva, the consequent ectropium is necessarily so great, that the eye inflames, suppurates, and perishes, from exposure. But, in ordinary and less severe cases, much may be done by careful dressing and bandaging. The lids must be kept,

s much as possible, on the stretch, during the progress of cicatriza-
on; for if this is not done, little or no new skin will be formed,
ut the ulcer will be covered at the expense of the loose integu-
ents around, in the same way as an ulcer of the scrotum will some-
mes heal up without almost any formation of new skin. The
atient, then, in whom the cicatrization of a burn in the neighbour-
ood of the eyelids is going on, ought not to be allowed to use his
yes, but should keep the lids, both of the injured and of the sound
de, constantly shut, except when the dressings are changed.
et pledgets, spread with simple cerate, be laid upon the parts,
nd round the head a roller applied so as to press gently on the
ds, and keep them on the stretch. This will appear probably a
ery tedious and annoying mode of treatment. To be allowed to
se the eyes, would be much more agreeable to the patient, till
e found, as soon as the process of healing was finished, that he had
st the power of closing the lids, or that a portion of their inner
rface was permanently exposed by eversion.

Burns by gunpowder are to be treated in the same way as other
urns, except when unexploded grains of the powder have been
rced into the skin of the eyelids. When this is the case, the par-
cles must be carefully picked out, one by one, with a cataract
edle, an operation which sometimes requires several hours to
complish. We should not trust much to the application of a poul-
ce under such circumstances, which is recommended with the view
dissolving and bringing away the grains of powder. If they are
ft in the skin, indelible spots remain, similar to tatooing.

§ 4. *Incised and Lacerated Wounds.*

Punctured wounds of the eyebrow and eyelids are, in general,
t attended by any bad consequences. We must be upon our
ard, of course, lest a punctured wound of the upper lid has gone
eeper than its mere external appearance might denote, and the
strument with which the wound was inflicted penetrated deep
to the orbit, or through the orbitary plate of the frontal bone.
e must also examine carefully whether any portion of the instru-
ent, (the broken end of a stick, for example,) may not have sepa-
ted in the wound, and be lodged in the loose cellular substance
rrounding the eyeball.

The edges of incised wounds of the eyebrow are to be brought
ccurately together, and retained by slips of adhesive plaister; or if
ese seem insufficient, the interrupted suture is to be employed,
ith slips of court-plaister between the stitches. The same practice
to be followed in incised wounds of the eyelids. Even when they
e parallel to the fibres of the orbicularis palpebrarum, and impli-
te only the integuments, we shall find the interrupted suture the
st means of maintaining the edges of the wound in exact apposi-
on, and thereby preventing any unsightly cicatrice. Stitches are
ill more necessary, where the whole thickness of the lid has been
vided, either transversely or perpendicularly. When the wound

is transverse, we may content ourselves with including only the integuments in the suture; but in perpendicular wounds, the needle ought to pass through the whole thickness of the divided lid. After the stitches are inserted, and the slips of plaister applied, the eyelids are to be closed, and covered with a pledget spread with simple cerate. A folded piece of linen is to be laid over the sound eye, and a roller, going round the head, is to press gently upon both eyes, so as at once to keep the dressings in their place, and to restrain the lids from moving. Generally, by the second or third day, union is effected, so that the threads may be cut out; after which, the slips of plaister are to be replaced, as well as the compresses and roller.

A perpendicular wound of the upper eyelid, passing through its whole thickness, so as to divide it into two flaps, somewhat like the two portions of a hare-lip, has received the name of *coloboma*. If neglected, the edges of such a wound are apt to cicatrize separately. A similar deformity sometimes occurs congenitally.[6] An operation, analogous to that for the cure of hare-lip, is to be had recourse to under such circumstances. The edges of the coloboma are to be pared, and then accurately brought into contact, and kept so by one or two stitches and slips of court plaister, till reunion is completed.

It occasionally happens, that through a wound of either eyelid, the eyeball is also injured. This does not alter the mode of proceeding with regard to the lid. So instantaneous is the instinctive shutting of the eye, when approached by any foreign body, the eyeball rolling upwards and the lid at the same moment descending, that the wound of the lid and that of the ball will probably correspond, when the eye is closed, so that we must be on our guard, lest symblepharon should take place under such circumstances. Mr Lawrence mentions a case, in which a horizontal wound of the upper lid having been neglected, a sort of button-hole was formed from the edges not having been kept in apposition; what was worse, accretion of the conjunctival surface of the palpebra to the globe had taken place, and the lid hung so much over the globe as to render the eye almost useless.[7] On the 1st May 1836, I saw a boy at the Glasgow Eye Infirmary, who had been wounded in the upper eyelid, six weeks before, with a sharp piece of stoneware. The lid could not be raised from the eyeball, so as to bring the cornea into view. There was evidently symblepharon, and probably the eyeball had been penetrated at the time of the wound, as well as the eyelid.

Lacerated wounds of the eyebrow and eyelids do not so readily admit of union as incised wounds. The swelling, inflammation, and suppuration, which are apt to ensue, often prevent immediate union. Allowed to heal without particular care, the contraction during the progress of cicatrization, is apt to produce ectropium, against which we ought to guard by treating lacerated wounds of these parts almost exactly as we would do incised wounds. Having carefully cleaned them, and removed any foreign substances which may have

been forced into the cellular membrane, we bring the edges accurately together. If the means employed to produce re-union, do not succeed, or if they seem to produce additional irritation, they must be removed, and the cure must be effected by the second intention. When the contusion and laceration attending a wounded eyelid are very great, of course no attempt at union need be made, till by leeching, and poulticing with bread and water, the irritation and tumefaction shall have subsided. By guarding against motion, and by the careful use of compresses and adhesive plaisters, after the parts have become quiet, we shall often be able to accomplish re-union, without any considerable deformity, or displacement.

Gangrene, however, and sloughing of the injured part may take place, and one or other lid may be destroyed. A man calling to consult me regarding an affection of the lungs, I noticed something remarkable about one of his eyes, and on examination found the lower lid entirely awanting. The skin of the cheek ended abruptly in the conjunctiva oculi. The upper lid was elongated, so as to supply the deficiency. On inquiring into the history of the case, he told me that several years before, he had received a severe injury of the lid with a reaping hook, followed by such a degree of inflammation, probably gangrenous, as destroyed the lid entirely.

In lacerated wounds, the lids may be so much injured, that after recovery, one or other of them shall be found adherent to the eyeball, and the patient unable to expose the eye. If the smallest chink, however, continues open, the eyeball will turn towards that point, and vision be thereby accomplished; as was the fact, no doubt, in the case related by Smetius,[8] in which the lids seemed so altered, and so agglutinated to the eyeball, that when the patient began to discern objects, it was absurdly concluded that he saw, not from between the lids, but down the nose, which had also been severely injured, and remained more expanded than natural.

Incised, and, still more, lacerated wounds of the lids are apt to bring on erysipelas, which, by passing deep into the orbit, may affect the dura mater, and cause death, as I shall have occasion to state more fully in the third section of this chapter.

Wounds of the upper eyelid are occasionally followed by palsy, in consequence of the injury done to the levator palpebræ superioris, or to the branch with which it is supplied by the third nerve. This branch, however, cannot be reached, unless the wound penetrates pretty deep into the orbit, and traverses the levator muscle. The patient, when he wishes to see, is obliged, as Ambrose Paré observes,[9] to raise the eyelid with his finger. Paré attributes this consequence of a wound of the upper eyelid, to unskilfulness, or inadvertence, on the part of the surgeon, inasmuch as he must have omitted sewing the wound properly, and applying the necessary compresses and bandage. M. Ribes mentions the case of a soldier, who had received a cut from a sabre in the upper eyelid, towards the superior edge of the tarsus. The wound healed readily; but the patient, even while he retained the faculty of vision, saw none, on account of the

impossibility of raising the upper eyelid, which continued constantly depressed.[10] Such facts, while they must impress us with the importance of leaving nothing undone which is likely to procure a complete re-union of the divided parts, may serve also to warn us against pronouncing a prognosis too decidedly favourable, in those cases in which we have reason to suspect that the levator of the upper eyelid, or its nerve, may have been materially injured.

Wounds of the eyebrow and eyelids are sometimes followed by very important effects. I have already (page 2) quoted a case from Dease, and referred to another by Petit, in which injuries of this sort were followed by inflammation within the cranium, and death. Mr Gillman has recorded[11] a case of bite of the eyebrow, by a dog, followed by hydrophobia. The loss of vision is another consequence apparently arising from even trifling injuries of the eyebrows and eyelids, which has attracted much attention.

For example, Camerarius relates the case of a young man, who received a slight wound at the inner angle of the left eye, close to the upper eyelid. The wound, though small, penetrated to the bone, and the patient immediately felt a severe pain, which was attended by swelling of the part, and by palsy of the right side of his body. The vision of the right eye became dim, and that of the left was totally lost, although nothing appeared diseased about the eye, except a slight dilatation of the pupil. The left upper eyelid was also paralyzed. The use of hot mineral waters seemed to restore the motion of the lid, and also of the right leg and arm. The sight of the right eye was in some degree recovered, but that of the left was irremediably lost. Morgagni was consulted by a lady, who had been wounded close to the left eye, in two places, by the fragments of the glass of a carriage window. She had seen none during the four days which followed the accident. One of the wounds was near the outer angle, and the other, which was smaller, was under the commencement of the eyebrow. Sabatier quotes[12] these facts as illustrative of the effects of injuries done to the branches of the fifth pair of nerves.

F. P. du Petit, having submitted to the French Academy of Surgery the case of an officer who became completely amaurotic in consequence of a sword-wound in the eyebrow, his communication, we are told, excited a controversy on the subject. Some explained the fact by attributing it to the concussion of the brain, produced by the instrument of injury; others thought it probable that the sword had penetrated the orbit and touched the brain; while a third party denied the fact altogether. In this state of the question, Vicq d'Azyr had recourse to experiment. He laid bare, in a variety of animals, the frontal and superciliary branches of the fifth pair; he bruised and tore the exposed nerves; and convinced himself that this was speedily followed by blindness.[13]

Sabatier, Beer, and others suppose, that the injury of the supra-orbitary nerve, or of some other of the branches of the fifth pair, operates sympathetically on the eye, through the medium of the

nasal branch of that nerve, which assists in the formation of the lenticular ganglion. Admitting this supposition to be true, the question naturally arises, how an injury of the fifth pair, operating through the medium of the lenticular ganglion, should produce blindness. This point has been taken up by M. Ribes, who contends, that the ciliary or iridal nerves, (the branches given off by the lenticular ganglion,) do not all go to the iris, but that several of them, having reached the anterior part of the eye, penetrate the corpus ciliare, and send filaments back towards the retina.[14]

Beer has discussed the subject of amaurosis from wounds of the branches of the fifth nerve, at great length.[15] The substance of his observations is, that, in severe cases, the blindness may be instantaneous; in less severe cases, slow; sometimes not till after the process of cicatrization has begun, or is completed; that it may be a consequence of tension of the nerve, or pressure upon it produced by the cicatrice; that the pupil is sometimes expanded, sometimes contracted, in such cases; that we must beware of confounding amaurosis from wounds of the branches of the fifth pair, with amaurosis from concussion of the eyeball, and perhaps laceration of the retina, and bear in mind, that along with a wound of the eyebrow or eyelids, there may have been a severe blow on the eyeball; that in cases in which the amaurosis is really sympathetic, vision may often be completely restored by dividing the lacerated nerve.

Chopart,[16] Boyer,[17] and others, have adopted a different view from that of Sabatier and Beer, upon the subject of amaurosis consequent to wounds of the eyebrow and eyelids. They have observed that blindness is not the only attendant on such injuries; but that convulsions, palsies, delirium, coma, and even death, have not unfrequently been known to result apparently from such wounds, but, in fact, from disease of the brain, either concomitant with, or produced by, the external injury. They have, therefore, concluded, that we ought not to account the amaurosis a mere nervous sympathetic effect, or a mere re-action from the injured nerve of the face upon the nerves of the iris or retina; but that the irritation arising from the wound is propagated to the brain, that the nervous symptoms which follow, are to be ascribed to disease arising in that organ, and that the affection of the brain, or of its membranes, in such cases, generally partakes of the nature of inflammation, followed by effusion or by suppuration. In many cases of this sort, the result has been fatal, and dissection has demonstrated the truth of these views; while in cases of recovery, we should be led to suspect, that the amaurosis, and other nervous symptoms, have disappeared, not in consequence of dividing the injured nerve, but from the diseased state of the brain having subsided.

The instances on record which show that very serious, or even fatal disease of the brain, may arise in connexion with apparently slight wounds of the eyebrow or eyelids, are sufficiently numerous. Morgagni has narrated[18] several highly interesting cases of this

sort. The conclusion to be drawn from such cases, is evidently this, that we must watch the effects of such injuries, keep the patient quiet, and on low diet, and have recourse freely to the use of blood-letting, if there appear the slightest symptoms of any affection of the brain, or its membranes. Similar practice must be followed, if we have reason to conclude that the amaurosis, concomitant with a wound of the eyebrow or eyelids, is the result not of the injury done to the branches of the fifth nerve, but of concussion of the eyeball. I have seen numerous examples of a blow on the eye inducing amaurosis, without in the least affecting the vascularity, or the transparency, of its different textures; and I can easily conceive, that had any wound of the integuments in the neighbourhood of the eye accompanied such blows, I might have been led into the erroneous supposition, that the amaurosis was not direct, but sympathetic.

It is proper also to mention, before quitting this subject, that the section of the injured nerve, proposed by Beer, and which he expressly states to be a means which had never failed him, has been repeated in several instances by others, without producing any effect upon the amaurosis. "I have met," says Dr Hennen, "with one or two cases of amaurosis from wounds of the supra-orbitary nerve; the perfect division of the nerve, produced no alleviation of the complaint, but after some time, the eye partially recovered."[19] "When the defective vision follows a wound in the forehead," says Mr Guthrie, "the only hope of relief that we are at present acquainted with, lies in a free incision made down to the bone in the direction of the original wound; and even of the efficacy of this, I am sorry I cannot offer testimony from my own practice, having failed in every case in which I tried it."[20]

Many other remedies deserve a trial, in cases of amaurosis, apparently arising from injuries of the fifth pair, besides the operation here referred to. In a case recorded by Dr Lichtenstädt, in which the amaurosis seems to have originated in a wound of the infra-orbitary nerve, made in opening a scrofulous abscess, electricity was singularly useful in restoring vision.[21]

It is well known that every wound of the branches of the fifth pair, does not produce amaurosis. In a case which lately fell under my observation, mydriasis rather than amaurosis was the effect of such an injury; for while with the naked eye the patient could not tell that a paper held before him was printed, when he looked through a pin-hole in a card, he could read even a small type. Magendie has even endeavoured to show by experiment that pricking the branches in question, especially the supra-orbitary, infra-orbitary, and lacrymal, has no bad effect on vision. He has been led to propose galvanizing the eye, by touching these nerves directly with the wires communicating with the opposite poles of a galvanic trough.[22] The consideration of these facts naturally lead us to regard with still greater doubt, the alleged occurrence of purely sympathetic amaurosis from slight injuries of the fifth pair, and to suspect, that in all the supposed cases of this sort, there has been,

in addition to the external injury, either concussion of the eyeball, or disease excited within the cranium.

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[1] Lawrence's Treatise on the Diseases of the Eye, p. 126; London, 1833.
[2] Zeitschrift für die Ophthalmologie; Vol. i. p. 125; Dresden, 1830.
[3] Reaumur, Histoire des Guêpes; Mémoires de l'Académie Royale des Sciences, 1719; p. 350; Amsterdam, 1723.
[4] Cours public d'Ophthalmologie; Lancette Française, 7 Janvier, 1837.
[5] See Lonsdale, in London Medical Gazette; Vol xi. p. 696; London, 1833.
[6] Das Auge, vom Professor Beer, p. 55; Wien, 1813. Heyfelder, in Ammon's Zeitschrift für die Ophthalmologie; Vol. i. p. 481; Dresden, 1831.
[7] Op. Cit. p. 127.
[8] Trnka de Kržowitz, Historia Amauroseos, p. 16; Vindobonæ, 1781.
[9] Œuvres; Liv. x. Chap. 24.
[10] Mémoires de la Société Médicale d'Émulation; Vol. vii. p. 92; Paris, 1811.
[11] Dissertation on the Bite of a Rabid Animal, p. 170; London, 1812.
[12] Traité d'Anatomie; Tome iii. p. 228; Paris, 1791.
[13] Journal Complémentaire des Sciences Médicales; Vol. xliv. p. 201; Paris, 1832.
[14] Mémoires de la Société Médicale d'Émulation; Tome vii. p. 99; Paris, 1811.
[15] Lehre von den Augenkrankheiten; Vol. i. pp. 176, 185, 189; Wien. 1813.
[16] Treatise on Chirurgical Diseases, translated by Turnbull; Vol. i. p. 267; London, 1797.
[17] Traité des Maladies Chirurgicales; Tome v. pp. 245, 248; Paris, 1816.
[18] De Sedibus et Causis Morborum, Lib. iv. Epist. 51; Tome iii. p. 59; Ebroduni, 1779. See a case in Bright's Reports; Vol. ii. Part i. p. 143; London, 1831.
[19] Observations on Some Important Points in Military Surgery, p. 366; Edinburgh, 1818.
[20] Lectures on the Operative Surgery of the Eye, p. 102; London, 1823.
[21] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. vi. p. 569; Berlin, 1824.
[22] Journal de Physiologie; Tome vi. p. 156; Paris, 1826.

SECTION II.—PHLEGMONOUS INFLAMMATION OF THE EYELIDS.

Phlegmonous inflammation of the eyelids occurs more frequently in children than in adults, and oftener in the upper than in the lower lid.

Symptoms. The affected lid is of a deep-red colour, hot, swoln, and very painful on being touched. The swelling spreads from the edge of the lid, but is generally limited in its progress by the margin of the orbit. It is soon so considerable as to prevent the eye from being opened; the pain is much increased by the least attempt to move the eye. If the inflammation is unchecked, the pain becomes pulsative, the swelling increases, assumes a livid red colour, and begins to point generally about the middle of the lid. The pain is now attended by a pricking sensation. The hardness of the swelling diminishes, and at its most prominent part it becomes less sensitive to the touch. The lid has suppurated, the fluctuation of the matter

is now distinct, and by and by the abscess bursts through the integuments. In some cases, the abscess gives way on the inside of the lid.

Causes. Abrasion, and other injuries of the skin covering the eyelids, appear to bring on phlegmonous inflammation; but not unfrequently the cause is obscure, especially when children are the subjects.

Prognosis. This disease being neglected or mistreated, a portion of the integuments of the eyelids may be lost, from ulceration, or from the inflammation going on to gangrene; the consequence will be contraction of the lid, and perhaps ectropium.

Treatment. Leeches to the swoln lid, followed by the constant application of an evaporating lotion, constitute the local treatment during the first or purely inflammatory stage. The patient is also to be purged, to keep at rest, and live low. If these means are found insufficient to procure the resolution of the inflammation, a warm bread and water poultice is to be applied in a linen bag, and as soon as fluctuation is distinct, the abscess is to be opened with the lancet, the incision being made transversely, or parallel to the natural folds of the skin of the eyelids. The matter is generally found immediately under the skin. The poultice is to be continued till the swelling subside, and the abscess cease discharging.

SECTION III.—ERYSIPELATOUS INFLAMMATION OF THE EYELIDS.

In erysipelas of the face, vulgarly styled *the rose*, the eyelids are always much affected, especially the upper. Erysipelas may also arise in the eyelids, and be confined to them. In general, one side only is affected; but sometimes both at once, or first the one, and then the other.

Local symptoms. The lids are much swoln, so that the eye is shut up. The swelling is of a pale red colour, but sometimes of a bright scarlet, or even of a deep and livid red. The redness disappears on pressure, but instantly returns when the pressure is removed. The pain is in general not considerable, nor pulsative. The swelling feels hot, and the patient complains of a stinging and burning sensation in the part. A serous effusion frequently takes place under the cuticle, which becomes elevated in vesicles. These bursting, allow the fluid they contain to escape, and form crusts. On these falling off, the skin is generally left in a sound state; and the swelling subsiding, the eyelids recover their power of motion.

In more severe cases, the inflammation runs on into suppuration and sloughing of the subcutaneous cellular membrane. In such cases, the redness has more of the livid hue, the swelling is more considerable, and soon becomes tense and firm, the sensation of heat and pain is much aggravated, and is attended by throbbing. At first, the cellular texture contains a whey-like serum. Mr

Lawrence mentions his having seen this effusion into the eyelids, almost of milky whiteness. It gradually becomes yellow and purulent, and is diffused through the swoln cellular membrane, which becomes so disorganized, that it comes away, after the abscess bursts or is opened, in shreds soaked with matter. An erysipelatous abscess differs from a phlegmonous one in this respect, that it is not bounded by a sphere of adhesive inflammation, but extends extremely irregularly in different directions, producing extensive sloughings of the cellular membrane. An abscess of this sort communicates a peculiar boggy impression to the finger. If neglected, suppuration may take place as well beneath as exterior to the orbicularis palpebrarum, and even destroy the ligamentous layer of the eyelids. At length the integuments give way in one or more points, a small quantity of matter is discharged, and shreds of disorganized cellular membrane may be extracted. Left, in this way, to run its course, severe erysipelas leaves the lids so altered, and their several textures so agglutinated from the loss of the connecting cellular membrane, that they are long before they recover, if ever they recover, their natural pliancy and mobility.

The conjunctiva, Meibomian follicles, and excreting lacrymal organs, always suffer more or less in erysipelas of the eyelids. A puro-mucous secretion accumulates, during the night, along the edges of the lids, and in the nasal angle of the eye. From this symptom the inexperienced practitioner, called to an advanced case of erysipelas of the lids, is apt to suppose, that it is one of contagious ophthalmia. The absorption of the tears is impeded, and there is a slight accumulation of mucus in the lacrymal sac. In some cases, a stillicidium lacrymarum remains after all the other symptoms have disappeared. In severe cases, ending in diffuse suppuration, the matter occasionally penetrates into contact with the lacrymal sac, which is already distended by the presence of an inordinate quantity of mucus. After the integuments in such a case give way, a superficial observer may be deceived by the appearance of the parts. He probably pronounces the case to be a fistula of the lacrymal sac, and forthwith opens the sac. It may happen, however, that the purulent matter of an erysipelatous abscess actually makes its way into the lacrymal sac, which thus comes to be filled with pus received from without, in the production of which its lining membrane has had no share. The latter case, which, for the sake of distinction, may be called *spurious fistula* of the lacrymal sac, must be carefully distinguished both from the former, in which the sac is entire though distended with mucus, and from those diseases hereafter to be described, in which the purulent matter which fills the sac, is the result of inflammation of the lining membrane of that cavity itself. The sac, and the lacrymal canals, may suffer so much by being involved in the erysipelatous abscess, as to be rendered ever afterwards unfit to execute their functions.

Erysipelatous inflammation, spreading from the eyelids to the cellular membrane of the orbit, sometimes terminates in abscess

within that cavity. This appears to be one of the modes, perhaps the most frequent but least suspected mode, in which erysipelas of the face or scalp proves fatal. A fatal result may take place under such circumstances, without any inflammatory affection of the membranes or substance of the brain being detected after death. In such cases, the formation of matter within the orbit sometimes takes place suddenly, at other times slowly and insidiously. The matter is generally found to be deposited in small quantities in different parts of the orbit.

Numerous cases similar to the following one, are recorded by Dr Piorry.

Case 105.—A woman, aged 60, who had been admitted into the Salpétrière, on account of slight bronchitis, was seized with erysipelas, commencing on the right cheek, and affecting chiefly the region of the lacrymal sac. The redness extended to the eyelids, which became so much swoln as to close the eye. The disease spread to the other parts of the face and to the opposite eye. The part first affected ceased on the fourth day to be elastic, and became doughy. The general health was not at first affected; but the pulse rose as the disease made progress, and on the third day, stupor, coma, and delirium were added to the other symptoms. The hairy scalp was scarcely affected.

The disease was not at first regarded as one of serious import. An abstemious diet, and some simple lotion, made up the treatment. When the symptoms grew more severe, and the much swoln eyelids became covered with vesicles, numerous leeches were employed, and derivatives applied to the lower extremities. These means proved fruitless, and the patient died on the fifth day.

On inspection, 24 hours after death, the skin, which had been so very red during life, was every where of the same colour as that of the other parts of the body. It was scarcely at all thickened. Pus was found in two small abscesses, about the size of a pea, in the cellular substance of the right cheek, close to the periosteum; and another small abscess, not communicating with the former, was situated over the nasal duct. The eyelids presented pus in their cellular tissue. On removing the roof of the right orbit, small depositions of pus were found in the fatty cellular membrane around the optic nerve, and in that covering the floor of the orbit, chiefly towards its inner wall. There was no large abscess, neither did the small depositions of pus communicate with one another. With the exception of the cellular tissue, none of the parts within the orbit appeared inflamed; but the same was the case with the skin, although during life it had presented a crimson colour. The left orbit contained no pus; nor was there any abscess in or under the scalp. The brain presented no inflammatory nor other diseased appearances. The lungs had suffered from pneumonia. The stomach, otherwise healthy, contained a quantity of greenish and apparently bilious fluid. The intestines were sound.[1]

It sometimes happens that the cellular membrane of the orbit, although considerably affected, does not suppurate. On the subsiding of the acute symptoms, the eyeball in such cases is found to be deprived of its power of motion, is protruded, or has even become amaurotic from the pressure it has undergone. In a case which came under my notice, and which had been attended with suppuration of both upper and lower lids, the lids having been long kept closed, and the conjunctiva much inflamed, union took place between the upper lid and the lower edge of the cornea, ulceration of the latter having no doubt preceded this symblepharon. The probe was readily passed around the point of union, and the adhesion was divided so as to restore to the lid its natural motion. The centre of the cornea was found to be clear, the pupil natural in size, but motionless, and the retina insensible.

Constitutional symptoms. Erysipelas of the eyelids is generally preceded by rigors, and attended by considerable febrile irritation. The tongue is loaded, and the digestive organs much deranged. In fatal cases, death is preceded by delirium, subsultus tendinum, and coma.

Causes. As this disease frequently arises suddenly, without any local injury, it probably owes its origin to some peculiar state of the atmosphere, or to contagion. It is certainly much more apt to attack those whose stomach and bowels are in bad order. Local causes, as slight blows, the stings of wasps and other insects, leech-bites, incised or lacerated wounds of the eyelids, cuts and other injuries of the scalp, blisters on the head, exposure of the eyes suddenly to cold after long-continued weeping, and the like, frequently serve to produce it.

Treatment. An emeto-cathartic is the best of all general remedies in erysipelas; for example, one or two grains of tartras antimonii, with an ounce or two of sulphas magnesiæ, dissolved in two pints of water, and a tea-cupful given every two hours. In robust subjects, blood-letting may be practised with good effects; but in aged or debilitated patients, this remedy can scarcely be ventured on. After the stomach and bowels have been freely evacuated, gentle diaphoretics are to be employed.

A prejudice exists among the vulgar, against every sort of wet application in erysipelas; but I have witnessed much advantage from the use of evaporating lotions in this complaint, and have never seen them do harm.

A solution of nitrate of silver, in the proportion of 4 grains to 1 ounce of distilled water, dropped once or twice a-day upon the conjunctiva, represses the inordinate secretion of mucus.

We seldom require to touch the eyelids, when affected with erysipelas, with the lancet. Cases, however, do occur, in which scarifications, or even pretty deep incisions, ought to be employed.

Sir Richard Dobson's mode of scarification consists in making fine punctures, with the point of a lancet, over the whole inflamed part, in number from 10 to 50; then fomenting with warm water in a sponge, to encourage the bleeding and serous discharge; and repeating this operation two or three times in 24 hours, if the parts look red and tense. If done early, it shortens the disease; at all events, it relieves the vessels in a very remarkable degree, thus producing local benefit, while it also serves to check the severity of the cerebral and general symptoms. It prevents vesication, and what is more important, diminishes the chance of suppuration. Provided the punctures are very minute, and not lengthened into small incisions, they never leave any permanent marks, even on the smooth skin of the forehead, much less on the eyelids.[2] Dr Bright has related[3] ten cases of erysipelas, treated by minute punctures. In most of them the lids were affected, and the practice appears to have been highly beneficial.

In severe cases, threatening to go into suppuration, the practice

by incisions ought to be adopted. A transverse incision through the skin and subcutaneous substance of the affected lid, if employed early, may prevent suppuration and sloughing; if later, it will afford the readiest outlet for the matter and disorganized cellular membrane. A warm bread and water poultice is to be applied after the incision.

The two following cases, serving to illustrate both the progress of the complaint, and the mode of treatment by incisions, are related by Mr Lawrence, in his valuable paper on the nature and treatment of erysipelas, in the 14th volume of the Medico-Chirurgical Transactions :—

Case 106.—A medical student, about 24 years of age, had a violent attack of erysipelas of the face, apparently from exposure to cold air, after being in a crowded and hot room. The redness was vivid, with considerable tumefaction, particularly of the eyelids and forehead. There was great pain, headach, restlessness at night, and fever. He was bled to 20 ounces. The blood was buffed. He was freely purged, had salines with antimony, and low diet. He was much relieved by the loss of blood, and felt his head so much better, that he wished the bleeding repeated the same evening, but the friend who attended him would not comply with his desire. On the next and following days, he was better; the swelling and inflammation were nearly gone. The symptoms, although still inflammatory, did not absolutely require the repetition of venesection, and he was averse to it from a groundless notion that his constitution could not bear bleeding. He ought, however, says Mr Lawrence, to have been bled again. He took on the second day, four doses of calomel, each containing 3 grains, at intervals of four hours, and then a draft of infusion of senna with sulphate of magnesia, which operated very freely. In two more days, he indulged himself with some mutton broth, under the supposed necessity of supporting his strength after the evacuations he had undergone; and this brought on a relapse. The inflammation was now nearly confined to the right upper eyelid, which was much swoln, of a deep red, without fluctuation, and acutely painful. He was freely purged with calomel, followed by the same draught. Next day, the swelling and pain had greatly increased, but no fluctuation could be perceived. He urgently requested that the part should be opened, to relieve him from the severe suffering. Mr Lawrence accordingly made a transverse incision through the skin and tumid cellular substance, extending the entire breadth of the lid. About a tea-spoonful of white and almost milky fluid escaped. The cellular substance was swoln, condensed, and had a whitish appearance. This incision produced complete relief; the swelling lessened, the inflammation stopped, suppuration ensued, and some disorganized cellular structure was separated. A large ulcerated surface was thus left, which healed rapidly, without leaving any trace of the mischief that had occurred.

Case 107.—A girl of the town, about 25, robust, and of full habit, came under Mr Lawrence's care in St Bartholomew's Hospital, in the summer of 1825. The whole face was affected with erysipelas, but the palpebræ were enormously swoln, deep red, and shining. There was high inflammatory fever, with violent delirium at night. She was twice largely bled, the blood having the most inflammatory character, with great relief of the general symptoms, but without diminishing the inflammation and pain of the eyelids. On the second day after her admission, an incision was made along the whole breadth of each eyelid, and through the entire depth of the inflamed and swoln cellular structure, which had begun to slough, and contained matter diffused through its cells. Considerable portions of cellular membrane were subsequently detached, and there was some sloughing of the integuments, leaving a large ulcerated and ragged surface of the swoln lids, from which subsequent deformity might have been apprehended. The parts, however, granulated, and healed rapidly, and so completely, that not a vestige of the extensive mischief remained.

If a spurious fistula of the lacrymal sac has formed, it is to be

washed out once a-day with tepid water, mixed with a little of the vinous tincture of opium. A small quantity of lint dipped in the same tincture, is then to be introduced into the abscess, but not pushed so deep as to enter the sac. After the fistula has healed, should *blenorrhœa of the sac* continue, it will require to be treated as explained in the third section of Chapter VI.

Should the symptoms in erysipelas of the lids lead us to suspect that the disease is tending inwards to the orbital cellular membrane, blisters should be applied to the face, behind the ear, and to the temples. If the eyeball has become very prominent, and it seems probable that this is owing to an infiltration of pus into the cellular substance of the orbit, the lancet should be employed to give the matter exit. The situation where matter is most frequently deposited, is between the eyeball and the floor of the orbit. Should no matter flow on making a deep incision, still the discharge of blood will probably prove serviceable.

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[1] Piorry, Clinique Médicale de l'Hôpital de la Pitié et de l'Hospice de la Salpétrière, in 1832, p. 381; Paris, 1833.

[2] Medico-Chirurgical Transactions; Vol. xiv. p. 206; London, 1828.

[3] Bright's Reports of Medical Cases; Vol. ii. p. 98; London, 1831.

SECTION IV.—PHLEBITIS OF THE EYELIDS.

Case 108.—A man of 78 years of age was admitted into the Hôtel-Dieu at Nantes, with erysipelatous swelling of the face and eyelids. He had a quick pulse, pain in his forehead, and great thirst. General blood-letting, an abstemious diet, and diluents were employed. The œdematous state of the eyelids increased, and spread to the ocular conjunctiva. A considerable œdematous swelling was also observed in the right parotid region. The tension and redness abated considerably, but the pulse continued quick, the patient talked much, became delirious, and was affected with tremors of the limbs. He died with distinct symptoms of an affection of the brain.

On dissection, a circumstance attracted notice, which had not been observed during life; the veins of the forehead and temples felt hard, as if distended by an artificial injection. The scalp was swoln, especially posteriorly; and presented, towards the crown of the head, and on the left side of the sagittal suture, a small superficial ulcer, which the patient had not mentioned, so that, although probably the cause of all the symptoms, it had not been known during the life of the patient.

The two frontal veins, and their ramifications, extending to the crown of the head, were full of pus, either concrete or sanious. At several places, it was difficult to separate the viscid ropy pus from the lining membrane of the veins. The palpebral branches, which anastomose with those two trunks, were injected with purulent matter, more or less solid. This state was more remarkable on the left side. The infra-orbitary branches of the anterior frontal vein of that side were in the same state, and an incision of the eyelid and cheek disclosed a multitude of veins, superficial or deep-seated, filled with purulent clots or with a reddish sanies. The two temporal branches, and their ramifications, even the most deep-seated, the anterior and posterior auriculars, and the ramifications by which they originate in the cranium, were in the same state on the right side only. An incision of the subcutaneous cellular tissue and of the muscles of that region presented the same appearance as the cheek, only still more distinctly. A track of greenish viscid

pus marked the course of all those vessels, the coats of which were in some places entire, in others destroyed. The venous anastomoses, external to the parotid, formed a net-work, which might be compared to a varicose tumour, in a state of suppuration. The external jugular vein contained a black adherent clot, a little softened in its centre. Its internal surface was of a deep red, and evidently injected. It was not permeable to the blood, except towards its lower part. The internal jugular vein was healthy and empty. The right ophthalmic vein was diseased, and a venous abscess existed at the very point where it leaves the orbit to enter the cavernous sinus. The disease terminated suddenly at this place, being bounded towards the cranium by a clot shutting up the vein. The sinuses of the brain did not participate in the disease. The arachnoid was somewhat opaque, especially on the left side and at the anterior part of the brain. There was considerable serous infiltration under the arachnoid; with a little water in the ventricles. In none of the organs of the body was pus detected, except in the veins already mentioned. The liver was not examined.[1]

This case demonstrates the necessity, when erysipelatous swelling attacks the eyelids, of examining the scalp and of attending to the state of the veins of the face. It also shows that too much dependence must not be placed upon an apparent diminution of the external symptoms, for in this instance the tension and redness fell, notwithstanding the impeded and disorganized state of a considerable portion of the nervous system, and the close approach of death.

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[1] Archives Générales de Médecine; Mai, 1837; p. 63.

SECTION V.—CARBUNCLE OF THE EYELIDS.

This circumscribed, gangrenous inflammation of the cellular membrane is occasionally met with in the eyelids. The swelling is of a dark red, or purple colour, extremely hard, and attended by severe burning pain. Vesicles rise on its surface, occasioning intolerable itching. Ichorous matter is discharged, and the affected cellular membrane and skin becoming black and sloughy, at length fall out. The cavity left by the separation of the slough granulates and heals up.

Carbuncle occurs principally in old persons, whose constitutions have suffered from irregularities in diet.

Opium to relieve the pain; bark and wine, to support the strength; laxatives, and gentle diaphoretics, make up the general treatment.

An early and free incision into the tumour, most effectually relieves the pain, allows the matter to escape, and promotes the separation of the slough. An emollient poultice is to be applied after the incision has been made, and continued till the cavity left by the slough has filled up by granulation. The sore is then to be dressed with simple cerate.

SECTION VI.—MALIGNANT PUSTULE OF THE EYELIDS.

The disease long known in France by the name of *pustule maligne*,[1] is a gangrenous inflammation of the skin, characterized at its commencement by a vesicle filled with bloody serum, under which there forms a small lenticular induration, which, in its turn, soon becomes surrounded by an erysipelato-phlegmonous tumefaction, of a deep red colour, and glistening surface. Gangrene seizes the tumour, and extends rapidly from its centre to its circumference. This disease would appear in by far the greater number of cases, to be produced from contact with one or other of the lower animals, affected in a similar way, or from contact with their carcases. It is sometimes communicated from one human being to another. It occurs chiefly in farriers, shepherds, butchers, tanners, and others occupied much with the lower animals or their remains. It attacks those parts of the body which are habitually exposed, as the face, the hands, the arms, or such as have been accidentally exposed; and it has been more frequently met with during the existence of epidemic diseases of the carbunculous description among cattle, than at other times. The bloody serum of the pustule is the means by which the disease is propagated. Its progress in individual cases is rapid, and the result often fatal. Death has been known to occur in 24 hours after the person was attacked.

Malignant pustule is said to be rare in Paris, but common in Burgundy, Franche-Comté, and Lorraine. I am not acquainted with any account of this disease as observed in Great Britain, unless the cases published[2] under the name of *glanders in the human subject*, are to be regarded as instances of malignant pustule, to which it cannot be denied they bear in many respects a striking similarity.

When malignant pustule attacks the face, the erysipelato-phlegmonous inflammation spreads to the neck, and even to the chest. When the eyelids are the seat of the disease, the face becomes enormously swoln, and excessively pained. The patient is affected with deep-seated headach, attended by delirium. This is followed by stupor, and great prostration of strength. If he survives the separation of the portion which has become gangrenous, the lids are left in such a state of disorganization, that they consist of little more than conjunctiva. The consequence is, that as the process of recovery takes place, they are so greatly everted, that the eye is apt to be lost from want of its natural protection.

The local treatment most recommended is a crucial incision of the tumefied part, immediately followed by the application of the actual or potential cautery.

Internally, gentle stimulants and tonics appear to be most worthy of confidence.[3]

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[1] *Die schwarze Pocke* of the Germans.

[2] Brown, in London Medical Gazette; Vol. iv. p. 134; London, 1829.

Elliotson, in Medico-Chirurgical Transactions; Vol. xvi. p. 170; London, 1830; and Vol. xviii. p. 201; London, 1833.

[3] Morand, in Mémoires de l'Académie Royale des Sciences, pour 1766. Enaux et Chaussier, Méthode de traiter les Morsures des Animaux enragés, suivie d'un Précis sur la Pustule Maligne; Dijon, 1785. Davy La Chevrie, Dissertation sur la Pustule Maligne de Bourgogne; Paris, 1807. Basedow, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. vii. p. 184; Berlin, 1825. Rayer, Traité des Maladies de la Peau; Vol. ii. p. 71; Paris, 1827.

SECTION VII.—SYPHILITIC ULCERATION OF THE EYELIDS.

That the eyelids are not unfrequently the seat of syphilitic inflammation, is a conclusion to which I have arrived from witnessing at least ten cases of this sort. Some of them were suspected to be primary; the greater number were secondary.

When we see an adult affected with an inflammation of the edge of one eyelid only, which has continued for weeks, or it may be months, and has not yielded to local applications, but has rather grown worse, we should suspect syphilis. I have more than once seen syphilitic inflammation of the edge of an eyelid mistaken for simple ophthalmia tarsi, a mistake which may produce disastrous consequences. A similar caution applies to inflammation and ulceration near the inner canthus; for syphilitic ulceration, in this situation, is sometimes taken for dacryocystitis.

Case 109.—An old man, a patient at the Glasgow Eye Infirmary, acknowledged having been treated, some time before, for a primary affection, else I should have probably experienced some difficulty in deciding respecting the nature of the case. The lid was much swoln and everted, its conjunctiva greatly inflamed, and on the external surface of the lid there was a deep ulcer, painful, and spreading towards the inner canthus. The skin round the ulcer was of a dark red colour. I ordered him two grains of calomel and one of opium, night and morning. He returned in five days with another smaller ulcer near the punctum lacrymale of the same lid. The conjunctiva, covering the inner edge of the cornea, was also in a state of ulceration. The first ulcer of the lid was extending upwards and inwards, but at other parts its edge appeared inclined to cicatrize. The ulcer of the cornea was touched with the lunar caustic solution, and a carrot poultice ordered to the lid. Nine days after this, the eversion and thickening of the lid had become considerably less; the first ulcer had coalesced with that near the punctum, but was granulating and filling up. Soon after this, the mouth became sore, and the ulcer contracted and healed. The mercury was stopped and resumed according to the state of the mouth, and a decoction of elm-bark was given. As the lid continued to be everted after the ulcer had cicatrized, the thickened and inflamed conjunctiva was scarified, and the red precipitate salve was applied every evening; after which, the lid completely resumed its place, scarcely any deformity being caused by the cicatrice, and no opacity left on the cornea.

Case 110.—A boy, of 7 years of age, was brought to me with a foul sore occupying a great part of the right lower lid. He had been under the care of a person, who treated the case as one of fistula of the lacrymal sac, and thrust a probe through the ulcer in the direction of the nasal duct. This made the ulcer much worse. At first, I adopted the idea that it was a scrofulous sore, but in a few days, finding it to increase rather than contract under mild dressings, and the internal use of sulphate of quina, I began to suspect a syphilitic taint, and on

examining the throat, a foul ulcer was discovered on the velum. I gave the patient calomel and opium, under the influence of which the ulcer speedily contracted, and healed with considerable eversion. How the child had become affected with syphilis, appeared at first quite inexplicable; but at last it came out that he had been in the habit, for some time, of sleeping in the same bed with a person labouring under the primary symptoms of that disease.

Case 111.—J. S. aged 20 years, was admitted under my care, at the Glasgow Eye Infirmary, on the 28th September 1838. He was born with a congenital deficiency of the upper part of the prepuce, while the opening of the urethra was not through the glans penis, but close behind it. He had a chancre on the glans, a second on the malformed prepuce, two syphilitic sores on the scrotum, and a suspicious-looking superficial ulcer on the right leg. He dated these sores from the month of May. Ten weeks before his admission, a small hard swelling formed on the middle of the right upper eyelid, which he supposed to be a stye. When he applied at the Infirmary, the whole of the eyelid was much inflamed, and rather of a livid colour. It felt hard and tuberculated, and was a good deal swoln. Along its margin, to about two-thirds of its extent, it was in a state of ulceration, and presented a considerable notch just about the middle. The internal surface was much inflamed, the conjunctiva being thickened, and discharging a considerable quantity of puriform mucus. He constantly held a handkerchief to the eye, to relieve the burning pain of the ulcer. His right cornea was nebulous, which he attributed partly to ophthalmia in childhood. Pulse 108, small. Occasional rigors. He complained of weakness. He had used no mercury.

The appearances in this patient were very characteristic. The general swelling of the whole eyelid, the hard nodulated surface of the swelling, the livid colour, the spreading of the ulcer along the edge, which at one point it had notched by a complete loss of substance, extending even to the cartilage, and the severe pain felt in the part, were all well marked, so that before asking any questions about the patient's previous health, the syphilitic nature of the case was forced upon my consideration. The patient gave a very confused account of the rise and progress of his ailment; but there could be little doubt of the secondary nature of the ulcer of the eyelid.

All the sores speedily healed under the influence of calomel and opium.

Syphilitic ulceration of the eyelids generally occurs either on the edge, going on to destroy at once the skin, the cartilage, and the conjunctiva; or on the integuments, proceeding rapidly to form a deep and foul excavation. If near the inner canthus, the ulcer is apt to penetrate into the lacrymal sac. It would appear that sometimes the ulcer commences on the inside of the lid, spreading over a considerable extent of the conjunctiva. I have not witnessed this; but Mr Lawrence mentions his having seen some cases, in which foul syphilitic ulcers spread over the whole of the inner surface of the upper lid, without appearing externally. In one case, the sore, he believes, would not have been discovered, if he had not been directing his attention some time before to the subject, so that he was led to evert the eyelid, when he discovered a syphilitic ulcer as large as a sixpence.[1]

I remember M. Cullerier mentioning in his lectures at the *Hôpital des Vénériens*, that chancres of the eyelids were sometimes brought on by a kiss from an infected person, and in other cases, by the virus being conveyed on the finger. In one case which I treated, I was led to suspect that the disease had been communicated in some such way to the eye; for, besides a deep ulcerated notch in the edge of the lower eyelid, there was a chancre on the

conjunctiva oculi, close to the margin of the cornea. The pupil of the affected eye was small, and somewhat dragged towards the ulcer, but there was no iritis. The case did well, under the use of mercury. A similar ulcer, however, of the conjunctiva oculi, only smaller, existed in the old man, whose case I have related, and in whom the affection was secondary.

Secondary sores on the eyelids are generally attended by other secondary symptoms, particularly by ulcerations of the throat, and eruptions on the skin.

Both the primary and the secondary cases are most effectually relieved by the use of mercury. Either to mistake the nature of the ulceration, or to trifle with it in the non-mercurial way, would be to expose the patient to the loss of the affected lid, and even of the eye.

The following case, related by Sir Charles Bell, is interesting on several accounts :—

Case 112.—A man presented himself in the hospital, with a squint, the left eye being distorted from the object. On the upper eyelid of the right eye, there was a deep venereal ulcer. The man was in danger of losing that eye, and required prompt assistance ; but before he could be brought under the influence of mercury, the sore became deeper, and the cornea opaque. The superior rectus muscle being injured by the increasing depth of the sore, the pupil became permanently depressed. The sight of the right eye being now lost, the left eye came into use ; it was directed with precision to objects, he had no difficulty in using it, and it daily became stronger.

After a few weeks, medicine having had its influence, the sore on the right upper eyelid healed, the inflammation of the eye and opacity of the cornea gradually diminished, and the light again became visible to this eye, first yellow, and then of a deep purple. The muscles now resumed their influence, and the right eye was restored to parallel motion with the left, so as considerably to embarrass the vision. But the inflammation of the upper eyelid had been so great, as to diminish its mobility ; and what appeared remarkable, the lower eyelid assumed the office of the upper, being depressed when the patient opened the eye, and elevated and drawn towards the nose when he attempted to close it. The upper eyelid was not only stiff, but diminished in breadth ; so that, notwithstanding the remarkable elevation of the lower lid, their margins could not be brought together, and the motion of the eyeball could be seen. On the patient's attempting to close the eye, the pupil was always elevated, and the white of the eye exposed.[2]

Dr Campbell has recorded a case, in which the upper and lower eyelids of the right side, were wholly destroyed by syphilitic ulceration.

Case 113.—Henry Muir, aged 28, was admitted into the Edinburgh Royal Infirmary on the 17th December 1831, with his whole forehead covered with incrustations and the cicatrices of previous sores. Commencing at the left superciliary notch, and extending to the external angle of the right orbit, there was a lengthened depression, apparently the result of an exfoliation of the right superciliary ridge, and neighbouring portions of the os frontis. Both eyelids of the right side were completely gone, and the conjunctiva was found to be tightly stretched from the upper margin of the orbit, with which it was firmly connected, to the lower, being here continuous with the integuments of the cheek, as it was above with those of the forehead. The whole conjunctiva was thickened, and the portion to the inner side of the cornea was partly in a granulated state. The cornea was opaque, and appeared as if a thickened and somewhat corrugated membrane extended over it. Within the external angle of the os frontis, there was a small patch of red membrane, with some ulcerated points, through which

a limpid fluid, like tears, sometimes copiously exuded. A considerable part of the conjunctiva appeared superficially ulcerated. No trace of the puncta lacrymalia could be discovered. With this eye the patient was sensible only of very strong light, as that produced by placing a lighted candle close to the eyeball. The eye moved in the orbit to a limited extent, its motions being retarded by the tense state of the conjunctiva.

The prepuce had been entirely destroyed by ulceration, leaving the glans penis uncovered. There was an ulcer, with undefined edges, encircling the root of the penis, and another on the lower side of the penis near the glans, where a small opening communicated with the urethra, and allowed a great part of the urine to escape. An ulcer of a similar character was also observed on the nates.

No satisfactory history could be obtained of the case. The ulcers were believed to be syphilitic, and the patient admitted that he had taken mercury to a considerable extent.

When the patient was admitted into the hospital, a considerable part of the sclerotic conjunctiva presented a raw surface; but after the use of an astringent lotion, it came to be covered with a thin film of new cuticle, excepting two very limited portions at the inner and outer angles of the eye. At two places, a little distant from each other, near the outer angle of the eye, and a little below the situation of the lacrymal gland, the tears were seen exuding from very minute and nearly invisible orifices, where they collected in globules, and whence they trickled down the cheek. At the inner canthus, there was sometimes seen resting upon the surface, a little clear fluid, which, it was conjectured, might come from the lacrymal sac, if this cavity was not obliterated. The patient suffered neither pain nor inconvenience from the exposed state of the eye.

The ulcers on the genitals being in a chronic and indolent state, showed little disposition to take on a healthy action; but by putting the patient on a generous diet, and administering nitric acid internally, together with the local application of lunar caustic, followed by solutions of sulphate of copper and sulphate of zinc to the sores, these were brought into a healing state.[3]

In his remarks on the case, Dr Campbell observes, that in carcinomatous affections of the eyelids, requiring their removal, surgeons have directed the eyeball to be extirpated at the same time, in order to save the patient from the extreme degree of suffering which would otherwise arise from its constant exposure; but that the case shows a state of irritation not to be an invariable result of such exposure, since the patient experienced neither pain nor uneasiness, nor was likely to do so, the parts being covered and protected by the formation of a new cuticle over the surface left exposed by the loss of the eyelids.

This view of the matter is so far confirmed by the case of a pauper patient in this town, whom I had an opportunity of examining on the 13th September 1838, through the kindness of Dr Jackson, under whose care she then was. I shall here embody the account, published[4] by Dr Jackson, of this patient, with such additional notes as I took of her case. It must not be overlooked, however, that in cases such as those described by Dr Campbell and Dr Jackson, the conjunctiva would accommodate itself gradually to exposure, in proportion as the eyelids became destroyed. The irritation would probably be much greater, if these parts were removed at once by a surgical operation.

Case 114.—The patient is a widow of 60 years of age. The entire nose and nasal bones, a considerable portion of the ethmoid bone, and of the superior maxillary bones, the inferior turbinated bones, the vomer, and the whole hard and soft palate, have been destroyed by ulceration and exfoliation, so that the nostrils and mouth are converted into one opening, without any sort of division

even in front. The opening is bounded above by the ethmoid bone, and below by the tongue; and is capable of admitting the five fingers. The alveolar processes of the upper and lower jaws have been completely removed. Over the centre of the frontal bone there is a large depression, the consequence of repeated exfoliation, and the integuments there are still in a state of ulceration, leaving portions of dead bone exposed. The whole of the upper lip, and the greater part of the lower, have been destroyed by ulceration; but the integuments surrounding the cavern into which the nostrils and mouth are now converted, though puckered and drawn inwards, are perfectly cicatrized. Especially on the left side, the finger is easily passed from the nostril into the antrum Highmorianum.

The eyelids on each side, as well as the eyebrows, have been completely removed by ulceration, and the skin has united to the conjunctiva, covering the sclerotica. The integuments proceed, in fact, from the circumference of the orbits into the conjunctiva bulbi, without forming any fold. The conjunctiva of each cornea is semi-opaque, permitting the dark appearance of the iris to be seen, but not the pupil. The eyeballs present their usual size, form, and consistence, but are almost destitute of motion. When the patient makes an effort to move the eyes, a slight motion of the skin is observed. Her whole power of vision consists in a perception of light and shade. She cannot distinguish whether one or two fingers be held before her eyes. The want of eyelids does not cause her much uneasiness when the eyes are shaded, but when she turns up her face towards the window, or to a bright light, the eyes are pained. Touching the eyeballs does not seem to excite any pain; they never appear red or inflamed. She does not seem to sleep much, and never soundly. When she goes to sleep, she covers the eyes with a bit of cloth. When she sits up, she keeps her head depressed towards her breast, so as to avoid the light.

On each side, there is a small fistulous opening, apparently communicating with the lacrymal gland, from which there is a constant exudation of limpid fluid. When she weeps, which she does frequently, there is a copious flow of tears from these openings down the cheeks, and she says that at the same time she feels a burning pain in the eyeballs. The surface of the eyeballs is always dry; never covered with mucosity.

No puncta lacrymalia can be discerned on either side; but below the inner canthus on the right side, there are two ulcerated openings which appear to lead into the lacrymal passage. From the feeling of elasticity which pressure in the neighbourhood of the inner canthi, particularly on the right side, yields to the finger, it is probable that the ossa ungues are gone, though in consequence of the firmness of the cicatrice there, and the pain which pressure produces, it is difficult to ascertain this point with any thing like certainty. No other part of the orbits, however, appears to be destroyed.

She seems to enjoy a considerable degree of smell. She can detect a bad smell, and relishes the odour of snuff.

She speaks with great difficulty, but her daughter understands what she says. It is almost impossible for her to swallow fluids. When she swallows spoon-meat, she lies on her back, and throwing the morsel down, she gulps it with difficulty, and an expression of pain. The tongue, from its constant exposure, is swoln and inflamed. Her hearing is much impaired.

Over the right scapula, there is a large ulcer, through which several pieces of bone have passed. The whole body is much emaciated. The arms and hands are particularly attenuated, and their joints very flaccid.

The commencement of her complaint she dates 14 years back. The bones of the head were affected, before any disease appeared in the face. The ulceration, after having destroyed the lower lip, attacked the upper eyelids, then the lower eyelids, whence it spread downwards and removed the nose and upper lip. The eyelids of both sides were removed before the nose was involved. She blames her husband for improper conduct towards her. She never had any eruption. She had not taken mercury antecedently to the disease commencing in the face. After that, she was salivated by mercury, and took large quantities of sarsaparilla, without the progress of the disease being checked. Large portions of bone came away at various intervals.

Dr Jackson, in his notice of the case, remarks, that it shows to what a dread-

ful extent secondary syphilis will proceed, in spite of mercury, sarsaparilla, &c., in a patient in whom the primary symptoms have not been treated with mercury. He thinks the extensive exfoliation of bone could not, in this instance, be attributed to mercury, but to the influence of syphilis.

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[1] Lectures in the Lancet; Vol. x. p. 324; London, 1826. Lancet for 1830–1; Vol. i. p. 735.

[2] Nervous System of the Human Body, Appendix, p. lvi; London, 1830.

[3] Edinburgh Medical and Surgical Journal; Vol. xxxvii. p. 254; Edinburgh, 1832.

[4] Lancet, 8th September 1838, p. 839.

SECTION VIII.—SYPHILITIC ERUPTIONS AFFECTING THE EYELIDS OF INFANTS.

Infants have repeatedly been brought to me, as affected with *sore eyes*, whom I have found to be labouring under the effects of congenital syphilis. This disease generally appears within a few weeks after birth, about the anus and organs of generation, and upon the face and hands. It assumes the form of flat and pretty broad pustules. They break, scab, spread, and run into one another, leaving the skin of a dark red colour, excoriated, and chopped, over almost the whole body, and with a peculiar wrinkled withered appearance, especially about the lips. The eyelids of such children[1] inflame and adhere in the morning; the cilia and the hair of the head fall out; there is much restlessness, itching, and fretfulness; and great emaciation ensues. Not unfrequently the corneæ become infiltrated with pus, and give way, an event indicative of excessive debility, and generally proving a precursor of death.

Cases of this kind may readily be distinguished from ophthalmia neonatorum, but are sometimes confounded with ophthalmia tarsi. I have known cases treated as itch.

From half a grain to a grain of calomel, combined with from a twelfth to a sixth part of a grain of opium, is to be administered thrice a-day. In a few days, evident improvement takes place; and by perseverance in the remedy, a complete and permanent cure is effected.

Tepid ablution of the lids, and a mild red precipitate salve to their edges on the child's going to sleep, make up the local treatment.

The woman who nurses a child affected in the manner described, is apt to take syphilis, becoming affected first with ulcers on the nipples, followed by sore throat, sores on the genitals, and an eruption on the skin.

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[1] Devergie, Clinique de la Maladie Syphilitique; Pl. 37; Paris, 1826.

SECTION IX.—SCIRRHUS AND CANCER OF THE EYELIDS.

All parts of the skin are not equally liable to be affected with cancerous ulceration. That of the face, and particularly that of the eyelids, is perhaps the most liable. Vulgarly called *eating cancer*, this disease slowly consumes the skin and the muscles, till it destroys not merely the eyelids, but perhaps a great part of the cheek, entering also into the orbit, attacking the eyeball, and at length proving fatal. Dr Jacob in some excellent observations which he has published[1] on the disease, points out as its characteristic features, the extraordinary slowness of its progress, the peculiar condition of the edges and surface of the ulcer, the comparatively inconsiderable suffering produced by it, its being incurable unless by extirpation, and its not affecting the neighbouring lymphatic glands.

Symptoms and progress. Like cancer of a gland, this affection of the eyelids presents two stages, the one of induration, and the other of ulceration. At some particular spot, either close to the edge of one or other of the eyelids, but much more frequently on the lower than on the upper, at their temporal angle, or on the side of the nose, near the lacrymal caruncle, some degree of thickening and elevation may at first be discovered, indicating the existence of a peculiar kind of tubercle, but which the patient often neglects as a wart, or something of no consequence. The indurated spot is at first uninflamed externally, presenting the natural colour of the skin, with the exception perhaps of some varicose vessels ramifying over it, and it is not particularly sensible. It may remain in this state for a considerable length of time, and attract almost no attention till it begins to ulcerate.

In one of the cases which have come under my observation, the first symptoms were hardening of the lower lid, fixedness as if it had been glued to the eyeball, so that it could not be moved, and a remarkable degree of retraction, as if the disease, originating in the cellular membrane of the orbit, had dragged the eyelid inwards.

That the disease sometimes originates in a mere crust or wart, which, being picked off with the finger, leaves a raw surface, exposed to the irritation of the tears, and apt to spread by ulceration, or in some common sort of tumour, which, allowed to burst on the inside, or, it may be, on the outside of the eyelid, becomes fretted, and is thus induced to assume the ulcerous or cancerous action, is a doctrine[2] which must be received with some hesitation. It has been asserted, indeed, that a mere scratch or excoriation of the edge of the eyelid, or the irritation of an old cicatrice, such as that which results from small-pox, may give rise to cancer of the eyelids; but it is more probable, that the ulcerative stage of the disease is always preceded by a specific tubercle.

A doubtful point is, whether the Meibomian follicles are often, or ever, the seat of scirrhus, ending in carcinomatous ulcer; but it

seems generally admitted, that the induration may commence in the conjunctiva, and may be limited to it for a long time; the whole structures of the eyelid becoming at length thickened and knobbed, and assuming a dark red colour. The conjunctiva may then become ulcerated, and the ulceration gradually involve the other textures.

The progress of cancerous ulceration of the eyelids is generally very slow. I have known it for years confined to the lower eyelid, without making almost any advance; nay, occasionally contracting, and partially, or even totally, cicatrizing; again to commence, and spread for a certain space, and again to heal. It has been known to remain for ten, nay, for twenty years, without making much progress. In other cases, however, we see the eyelids entirely destroyed, the eyeball exposed, so as to become inflamed, and at last to burst, the lacrymal passages laid open, the bones of the orbit deprived of their periosteum, and rendered carious, while the ulcer, spreading down the face, eats away the cheek, lays bare the teeth, and at last forms one common and hideous opening along with the mouth. Yet, even after it has produced the most shocking deformity, its progress is sometimes stayed for months or for years, so that the individual lives with his eyelids entirely gone, the eyeball dissected from almost all its connexions, and perhaps half of the face destroyed.

The appearances of the disease are different at different times. Sometimes it presents a scab, which, on being removed, is succeeded by another; but generally, the sore exposed on removing these successive scabs, is found to be slowly enlarging, growing deeper, and becoming more painful. When the sore becomes an open ulcer, too large, too irregular, and too active to be covered by a scab, we observe that it eats away all parts indiscriminately which may be in the direction in which it is spreading. In one of the cases which have fallen under my care, the ulceration of the skin appeared, after a time, entirely to cease, while the disease proceeded deep into the orbit by the inner side of the eyeball. Not unfrequently, we find that the progress of the ulceration is checked at one part of the circumference of the sore, while it is still advancing at another; or that the whole sore assumes, for a time, a healing action. When this is the case, the pain becomes less, the edges become smooth and glossy, and even the part within the edges becomes smooth, or is gradually covered with florid, healthy-looking granulations. These are occasionally firm in texture, and remain unchanged in size and form for a length of time. Veins of considerable size are seen ramifying over the surface of the sore. If it heals up, it does so in patches, which are hard and smooth, and marked with the same venous ramifications. When it again begins to ulcerate, it loses its florid hue, and glistening and granulating appearance. There is often a tendency to actual reparation, as well as to cicatrization: there is a deposition of new material, and a filling up in certain places, which gives an uniformity to the surface, which otherwise would be very irregular. The healing which occurs may take place on any part of the surface, whatever be the original

structure. In a case which Dr Jacob had under his care, the eyeball itself, denuded as it was by ulceration, became partially cicatrized.

The skin in the vicinity of the sore is not, in general, much thickened, or discoloured, differing in these respects from the disease called *lupus*, or *noli me tangere*, which we see attack the point of the nose, and sometimes spread to the face. The edges of the ulcer, in cancer of the eyelids, are occasionally formed into a range of elevations or tubercles, of a pale red colour, which, if removed with the knife, are speedily reproduced. But there is, in general, little or no fungous growth in this disease, nor indeed any elevation, except at the edges of the sore.

The veins which ramify over the surface of the sore are apt to give way, and considerable bleeding to take place. From the surface itself of the ulcer, there is no considerable bleeding. When hæmorrhage does occur, it arises from the superficial veins giving way, and not from sloughing or ulceration opening the vessels. Sometimes the surface of the sore assumes a dark gangrenous appearance, arising from effusion of blood beneath.

The discharge from the surface of the sore is not, in general, of the description called unhealthy, nor sanious, but yellow, and of proper consistence; neither is there more fœtor than from the healthiest sore, if the parts be kept perfectly clean, and dressed frequently. Mr Travers, however, whose short notice[3] of this disease differs in several particulars from the more elaborate description of Dr Jacob, mentions, that it is attended by an unhealthy discharge.

Dr Jacob has represented the sufferings of persons labouring under this disease as not very acute. He says, there is no lancinating pain, and that the principal distress appears to arise from the exposure, by ulceration, of nerves, and other highly sensible parts. In the cases he had met with, the disease, at the worst period, did not incapacitate the patients from following their usual occupations. He states that one gentleman, who laboured under this disease for nine years, and who died from a different cause, was cheerful, and enjoyed the comforts of social life after the ulceration had made the most deplorable ravages. These statements of Dr Jacob may be received with implicit confidence. Yet it must be noticed that when the ulceration affects the infra-orbitary and supra-orbitary nerves, very severe suffering is experienced. I have witnessed the most excruciating pain when the eyeball was attacked with the disease. It ulcerates and bursts, the lens and vitreous humour are evacuated, and sometimes till this emptying of the eye is effected, the pain is agonizing. I have known the lens protrude through the cornea for several days, producing great irritation. In such a case, it is probable that the iridal nerves convey the impressions which are so painful.

When the disease extends to the periosteum, the bones of the orbit are laid bare, and become carious. They sometimes exfoliate

in small scales, but more generally they are destroyed, as the soft parts are, by an ulcerative process. This may proceed to such a length, as to expose the nostril or the antrum, through the destroyed orbit, or even to lay open the cavity of the cranium through the orbitary plate of the frontal bone. Inflammation of the dura mater and of the brain will, in this case, soon put an end to the patient's sufferings; although more commonly he dies worn out by fever, and sometimes by diarrhœa.

Diagnosis. Modern researches, and especially those carried on by Professor Burns, Mr Hey, Mr Abernethy, Mr Wardrop, M. Breschet, Mr Fawdington, and others, into the nature of malignant tumours and ulcers, have established at least this fact, that there are essential differences between a number of diseases formerly confounded under the appellation of cancer. The improbability that structures so extremely different as the mamma, the uterus, the glans penis, the lip, the eyelids, and the eyeball, should fall into the same kind of degeneration, had formerly entirely escaped attention. It is probable that a still more accurate discrimination may be made between the various malignant disorders of these parts. We are now at no loss in distinguishing cancer from spongoid tumour, and spongoid tumour from melanosis, but with regard to the malignant ulcerations which attack different parts of the skin, and especially the skin of the face, there still exists a considerable degree of confusion.

Dr Bateman, Mr S. Cooper, and others, seem to consider this disease of the eyelids as *noli me tangere*, which, according to Sir Astley P. Cooper, is an ulceration of the cutaneous follicles. Dr Jacob, however, observes, that the disease commonly called cancer of the eyelids is evidently peculiar in its nature, and is to be confounded neither with genuine *carcinoma*, nor with the disease called *lupus*, or *noli me tangere*. From the former he thinks it may be distinguished by the absence of lancinating pain, fungous growth, fœtor, slough, hæmorrhage, and contamination of the lymphatics; from the latter, by the absence of the furfuraceous scabs, and inflamed margins, as well as by the general appearance of the ulcer, its history, and progress. Mr Lawrence has contrasted[4] cancer of the skin with lupus; the latter is a disease which also sometimes involves the eyelids;[5] but in fact, it is not easy to describe in words the differences between such diseases.

From syphilitic chancre on the eyelids, cancer may generally be distinguished by its slow progress, by its not causing so much swelling of the integuments around the ulcer, and by its history.

Treatment.—1. *Alterative and other medicines.* It is a question of great importance, whether this disease can be removed by any other means than the knife, or powerful escharotics. Dr Jacob's opinion is, that it bids defiance to all remedies short of extirpation. "I have tried," says he, "internally, alterative mercurials, antimony, sarsaparilla, acids, cicuta, arsenic, iron, and other remedies; and locally, simple and compound poultices, ointments, and washes,

containing mercury, lead, zinc, copper, arsenic, sulphur, tar, cicuta, opium, belladonna, nitrate of silver, and acids, without arresting for a moment the progress of the disease. I have indeed observed," adds he, "that one of those cases which is completely neglected, and left without any other dressing than a piece of rag, is slower in its progress than another which has had all the resources of surgery exhausted upon it."

Now although these remarks of Dr Jacob are perhaps rather too sweeping, yet it cannot be denied, that both internal and external remedies have extremely little control over this disease, and that though it may for a time seem to mend under their influence, it has rarely, if ever, been known to be thoroughly cured, except by destroying the part with caustic, or removing it by the knife.

The precipitated carbonate of iron sprinkled on the sore, and arsenic internally, are the means which, I believe, do most good. I have known them to operate as palliatives, but never to produce a radical cure; and therefore I should never trust to them.

2. *Caustics and cautery.* These means are certainly not much to be recommended. They are more painful, and not so sure as the knife. They do occasionally succeed when the disease is limited to the outer surface of the eyelid, or to the skin of the nose; never when the whole thickness of the eyelid is affected. Often they do harm instead of good.[6] The best is pure potash.

The great advantage derived from arsenical applications to lupus, has led to their use in cancerous ulcerations of the face; but in these cases they are neither so efficacious, nor so safe as in the former. Sometimes the irritation produced by them occasions the sore to spread more rapidly than it would otherwise do.

Dr Jacob mentions, that a woman in the Incurable Hospital at Dublin, had had a burning cancer plaister applied several times, and 17 years after, the arsenical composition called Plunket's powder, without any good effect. A gentleman, to whose case he repeatedly refers, had the sore healed, when it was very small, by the free application of lunar caustic, under the care of Mr Travers. It broke out again, however, and spread, without interruption, until it destroyed the lids and globe of the eye. Under these circumstances, he, in despair, submitted himself to a quack, who, bold from ignorance, gave a full trial to escharotics. He repeatedly applied what was understood to be a solution of muriate of mercury in strong nitric acid, which, in a short time, produced a hideous cavern, extending from the orbitary plate of the frontal bone above to the floor of the maxillary sinus below, and from the ear on the outside, to the septum narium within. The unfortunate gentleman survived, the disease continuing to preserve, in every respect, its original character.

Case 115.—Dufresne, a bleacher, aged 30, was admitted into the Hôtel Dieu on the 23d February 1831, having been affected for seven or eight months with a carcinomatous ulcer at the inner angle of the right eye. The ulcer had continued to extend itself from the very commencement.

M. Dupuytren, having satisfied himself of the cancerous nature of the disease,

endeavoured to effect its destruction by cauterization with the nitrate of mercury dissolved in nitric acid, a remedy he had found to succeed in similar cases. Three or four cauterizations were practised at intervals of eight or ten days; the fourth induced an erysipelas of the face, which had not been cured when M. Breschet took charge of the patient. He deferred attacking the cancer again, till the erysipelas had entirely disappeared.

On the 10th April, the ulcer was of an oblong form, occupying the inner angle of the right eye, and the corresponding ala of the nose; its base had a fungous nipple-like appearance, of a livid colour, and it discharged a trifling quantity of fœtid sanies. Its edges were unequal, notched, and a little inverted.

An ointment, composed of seven parts of lard and one of iodide of mercury, was now applied daily; but, after three weeks, the ulcer was scarcely in the least improved. The application was therefore changed for another, composed of seven parts of lard and one of biniodide of mercury. In a few days, the appearance of the sore was completely changed, its base became of a vermilion tint, the nipple-like excrescences and fœtid discharge disappeared, and the swoln edges gradually shrunk. After 12 days' employment of the ointment, the sore was treated with simple dressing, and healed rapidly. On the 3d May, the patient was dismissed entirely cured, without deformity, the scar being white, flexible, and free from pain or tumefaction.[7]

Case 116.—A woman, aged 69, was, at the end of March 1816, received into the hospital at Stuttgardt, on account of cancer in the face. The cancerous ulcer occupied the greater part of the forehead, extending from one frontal protuberance to the other. The inner half of each upper eyelid was likewise affected. The eyes were much inflamed, and there was great lacrymation. The whole ulcer was very foul, and its edges were everted and irregular. The frontal bone was covered by thick fleshy granulations. There was such a copious discharge of fœtid matter, that the dressings had to be changed several times a-day. The ulcer was very painful, and bled on the slightest touch. The woman was much emaciated, she could get no sleep in the night, and her strength was fast giving way under the influence of fever.

She gave the following history of the commencement of her disease. She had from her youth a small brown wart on the middle of the forehead, which, however, never gave her the slightest uneasiness, until 12 years before her admission, when it began to be itchy. This induced her to rub it, in consequence of which, while the itchiness gradually increased, the wart enlarged and became covered with a scab, which was often detached, and when this happened, an acrid matter flowed from the exposed surface. At last the wart fell away altogether, and there remained a spreading ulcer. As the pain was at first inconsiderable, she did not think of consulting any medical man, but made use of domestic remedies only; the pains, however, increasing, she was at last compelled to apply for assistance. Under such circumstances, it did not appear that much could be done. It was an object, at least, to mitigate the pain, and, as far as possible, bring the ulcer into a healthy state. For this purpose, Dr Klein, on the 7th April, applied to the whole ulcer, with the exception of that part situated on the eyelids, Côme's arsenical powder, and then dressed it with carrot-juice. On the second day there appeared, attended with great pain, a considerable swelling over the whole face, which, however, disappeared in a few days, under the use of opiates and cataplasms. On the 6th day, the external dressings easily came away from the eschar. The eyelids, now become cleaner, were dressed as before, but the very hard eschar was covered with a digestive ointment.

From one week to another, the separation of the eschar was looked for in vain; the edges, indeed, suppurated, but the eschar remained immoveable, and could not be lifted up with a spatula in the slightest degree. The pains had ceased. The edges continued quite clean, as also the eyelids, and the bad smell was entirely gone. The inflammation of the eye was now much abated; the woman could sleep, had recovered her appetite, and the fever was very inconsiderable.

At last, on the 26th January 1818, the eschar, with the corresponding piece of the frontal bone, came away, quite unexpectedly, along with the dressings, after it had remained immoveable and without any pain for a period of 22 months.

The separated piece of bone, amounting to nearly the middle half of the frontal bone, was 4½ inches long, and above 3 inches broad; in the middle it was more than 2 lines thick. It comprehended the whole substance of the bone, but more of the outer table than of the inner; of the latter there being rather more than 2 inches.

The dura mater, which was now exposed, was covered with thick matter, and by every motion of the brain was somewhat pressed outward. The ulcer was dressed with a light digestive salve; it remained in the same state, the pus discharged was laudable, and the dura mater protruded no farther.

The woman lived in this state, without any pain in the head, affection of the brain, or insensibility until the 15th May 1818, when she died of marasmus, in the 72d year of her age.

After the removal of the calvaria, the dura mater previously in contact with the carious surface of the frontal bone was found to be thickened, and covered with fleshy granulations and viscid matter. Beneath it there was an effusion of lymph. The thickening did not extend to the falciform process. The brain itself was in a perfectly natural state.

In the dried skull, the circumference of the aperture formed by the removal of the diseased piece of bone, was carious, but in such a manner that the upper part and inner edge of it were absorbed and smooth, while the under part extended into both orbits, especially the left, which appeared spongy and quite carious. The caries likewise extended over the roots of the nasal bones. The lacrymal bones were destroyed, as also the left orbitary process of the sphenoid bone.[8]

3. *Extirpation by the knife.* When the disease exists in a situation which admits of extirpation, the sooner it is done the better, and it can be effected best by the knife.

The effects of removing one or both lids, have already been explained. The upper lid will, much more than we could expect, supply the loss of the lower lid; and the lower that of the upper. If, however, the whole of the upper lid, or of both lids, be removed, the cornea will become gradually opaque from exposure, and the conjunctiva cuticular and insensible.

A ligature being passed under the parts to be removed, so as to enable us to raise them, the incisions ought to be made into the sound parts. If the disease adheres to the perichondrium, or to the periosteum, these must carefully be removed. If the disease has spread in any considerable degree to the conjunctiva of the eyeball, the eye can scarcely be saved, although this appears to have been effected in one instance, by Professor Gräfe.

Case 117.—Daviel was called to an Ursuline nun at Bourdeaux, 45 years old, on account of a tumour which she had for 20 years upon her right upper eyelid. It began by a small wen, and increased by degrees so as very much to incommode the patient.

She applied to a surgeon, who began with some drops of a liquid caustic, which enraged the tumour still more; he appeased it again by anodyne medicines; and, although the patient felt a continual sharp pain in the part, the tumour remained a long time without any sensible increase. She consulted another surgeon, however, who cut off the tumour. The ulcer, which was the result of this operation, did not heal, but, on the contrary, made great progress, and became callous. The surgeon touched it with lapis infernalis, and sometimes with a liquid caustic, which much increased the evil.

Daviel was of opinion, that there remained no other method of treatment, but a farther extirpation, which might not only save the eye, but prevent an incurable and fatal cancer. The disease had already made great progress under the eyelid, and it was much to be feared that it would spread into the eye, and over the face. He passed a crooked needle, with a waxed thread, under the lid, by which he suspended and drew up the lid and the tumour, which he cut off with a pair of curved

scissors, as far as he could under the orbit. Slight hæmorrhage ensued, but was soon stopped with dry lint, and a compress and bandage.

In 14 days she was perfectly cured; and although the lid was cut away very high, the eye remained very neat and well, performing its several functions properly when Daviel left Bourdeaux. Six years afterwards, he found the patient extremely well, seeing perfectly with the eye. What he considered very singular was, that the skin of the lid descended pretty low to the cornea, which it almost covered; so that the whole globe was in a manner hid. The descending skin looked like a lid without eyelashes.[9]

Case 118.—A woman, 60 years old, had a cancerous tumour, for 16 years, in the inner angle of the right eye. It began by a little wart, which itched violently, and made her scratch it very often, which so irritated the tumour, that in a little time it became as large as a dried fig flattened, with its edges turned outward and callous. It reached from the commissure of the lids to the ala nasi, and adhered to the bone.

Daviel dissected off the tumour down to the periosteum, but did not lay the bone bare; for he thought it sufficient for a complete cure to take away all the callosities. But he was mistaken; for the swelling increased, and the wound seemed larger than before. He used, in vain, all the remedies commonly thought of in such cases; he scarified the edges of the ulcer, to bring it to suppuration; but it became more hard and callous than before the operation, and much more painful. He now resolved to cut away all that remained of the tumour, with the periosteum, which appeared very much swelled. This second operation was so successful, that the swelling, and every other bad symptom, disappeared almost suddenly. In three days the wound looked red, and very well, without any pain, and the cicatrice was perfectly formed on the 15th day from the operation, without any sensible exfoliation of the bone, or the least deformity of the eye. Five years after, Daviel saw the patient in perfect health, and the cicatrice of the part very even.[10]

Case 119.—A country woman, 42 years of age, sought assistance on account of a cancerous tumour, which occupied the inner third of the upper and under eyelids, the caruncula lacrymalis, and the inner commissure, as far as the back of the nose, and was connected with the conjunctiva of the eyeball. Although, under these circumstances, there appeared little hope of saving the eyeball, yet this was attempted by the extirpation of all the diseased parts. For this purpose Professor Gräfe passed, from the side of the eye towards the nose, a bodkin-shaped instrument through the middle of the basis of the swelling, and carefully separated the diseased part of the conjunctiva from the eyeball. Then with a pair of blunt-pointed scissors, he divided the upper eyelid as far as the arch of the orbit, in such a way that the whole inner third of the eyelid was separated from the middle third; a similar incision was then made through the lower eyelid, and the two extremities of these incisions joined by another in a curved direction over the back of the nose. The carcinomatous tumour was then separated from the bones. After this, in consequence of the retraction of the remaining parts of the eyelids, nearly the whole inner half of the anterior hemisphere of the eye was exposed.

The wound was dressed simply with warm water, and the same dressing continued daily. To the joy of all concerned, the eyelids elongated, whilst the granulations extended more and more inwards, and within three weeks were united in such a way by a cicatrice, that not the slightest deformity or exposure of the eye remained. The reproduced commissure was found, on close inspection to want the puncta lacrymalia, the caruncula, and semilunar fold. The loss of all these parts, and the complete removal of both canaliculi lacrymales, produced no stillicidium lacrymarum, which, on physiological grounds, was to have been expected. Rudolphi was requested to examine the patient; but he was as unsuccessful as Professor Gräfe, in discovering the manner in which the tears were removed after the destruction of all the parts above mentioned.[11]

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[1] Dublin Hospital Reports; Vol. iv. p. 232; Dublin, 1827.

[2] Daviel, in Philosophical Transactions; Vol. xlix. Part i. p. 186; Lon-

don, 1756. Warren's Surgical Observations on Tumours, p. 27; Boston, 1837.

[3] Synopsis of the Diseases of the Eye, p. 100; London, 1820.

[4] Lectures on Surgery; London Medical Gazette; Vol. vi. p. 194; London, 1830.

[5] See Basedow, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xv. p. 497; Berlin, 1831.

[6] See Daviel's 1st and 10th cases in the Philosophical Transactions; Vol. xlix. Part. i. p. 186; London, 1756.

[7] Quoted from the Lancette Française, in the Lancet for 1830-1; Vol. ii. p. 607.

[8] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. iv. p. 13; Berlin, 1822.

[9] Philosophical Transactions; Vol. xlix. Part i. p. 189; London, 1756.

[10] Ibid. p. 191.

[11] 1822. Jahres-Bericht über das clinische chirurgisch-augenärztliche Institut der Universität zu Berlin, p. 3; Berlin, 1823.

SECTION X.—INFLAMMATION OF THE EDGES OF THE EYELIDS, OR OPHTHALMIA TARSI.[1]

The edges of the eyelids are subject to an inflammation of a very tedious character. It is this disease which, closing the Meibomian follicles, and destroying the bulbs of the eyelashes, produces the state termed *blear eyes*. If long neglected, it becomes obstinate, and, in some respects, incurable.

We usually term this disease *ophthalmia tarsi*, but it has received various names, and different views have been entertained of its nature. Any one affected with this complaint, was called by the Romans *lippus*. Hence *lippitudo*, which we sometimes use to signify the effects of this disease. Celsus's lippitudo, however, seems to have been what we now designate by the name of catarrhal ophthalmia. Comparing ophthalmia tarsi to eruptions of the hairy scalp, it has been called by some, *tinea palpebrarum;* while others have regarded it as herpetic or porriginous. As itchiness is one of the symptoms of the disease, it has been called *scabies palpebrarum*, and *psorophthalmia;* and it has even been supposed, that in certain cases at least, it consists in an eruption of itch, caused either by inoculation or by repercussion. That this complaint ever partakes of the nature of psora, is a notion which, in this country, is entirely laid aside. "I have seen," says Mr Lawrence, "innumerable cases of itch in its most aggravated form, but have never met with inflammation either of the eye or lids in such instances, either during or subsequent to the eruption. When the body has been covered with scabies to the greatest degree, I never saw any kind of ophthalmic disease attributable to this cause; indeed, it is well known that the head and face are nearly exempt from this loathsome disorder. Nor has the rapid cure of the itch by suitable treatment, in instances of its most extensive prevalence, had any injurious effect, within my experience."[2]

Ophthalmia tarsi affects the Meibomian follicles, their apertures running along the edge of the lid near its inner margin, the neighbouring portion of the conjunctiva, the glands at the roots of the eyelashes, and the surrounding skin. Even the cartilage is sometimes implicated.

Local symptoms. One of the most striking symptoms of the disease, is the adhesion of the edges of the eyelids in the morning, by means of a glutinous and superabundant secretion from the conjunctiva, Meibomian follicles, and ciliary glands. Incrusting during sleep into a gummy consistence, this matter binds the eyelashes together, so that the patient is obliged either to soften them before opening his eyes in the morning, or to use considerable, and even painful, effort for their separation. This is accomplished not without tearing out some of the eyelashes, which no doubt aggravates the inflammation of the sebaceous follicles at their roots, and produces a succession of little abscesses and ulcers. Frequently torn out in this way, and their bulbs injured or destroyed, the eyelashes are apt to become feeble, dwarfish, and irregular, or their reproduction to cease.

The Meibomian secretion, naturally bland, and small in quantity, serving merely to smear the edges of the eyelids, so as to prevent them from adhering, and to conduct the mucus of the conjunctiva and the tears towards the puncta lacrymalia, becomes in this disease augmented in quantity, and changed into a puriform matter. This matter of itself, as well as the inflammation in which it originates, causes constant irritation, and frequent itchiness of the eye and eyelids, and adhering to the eyelashes, prevents the little ulcers from healing which arise at their roots. The tears, excited by the irritation, are discharged more frequently than natural, and being no longer conducted along the edges of the lids towards the puncta lacrymalia, as they are in health, they drop over upon the cheek, chafing and excoriating the integuments. The consequence is, that we frequently find this disease attended with much swelling and redness of the eyelids, and the skin of the cheeks inflamed, ulcerated, or covered with scabs. Not unfrequently, the conjunctiva, lining the lids, is considerably inflamed, and gives out a disordered secretion. One or more of the Meibomian follicles are often greatly distended with purulent matter, which oozes out from their apertures on pressure. In other cases, the edges of the eyelids are occupied by a thick crust of matter, under which ulceration is proceeding slowly to destroy the secretory apparatus of the eyelashes. Sometimes the whole substance of the eyelids, near their edges, is thickened, indurated, and distorted, a state which is termed *tylosis.*

The local symptoms of ophthalmia tarsi, vary considerably in severity, in obstinacy, in the appearances of the matter discharged, and even in the seat of the principal morbid changes, for in some the Meibomian follicles, in others the ciliary glands or bulbs of the eyelashes, are the parts chiefly affected.

The inflamed state of the conjunctiva in this disease, as well as that of the Meibomian follicles themselves, produces a feeling of sand, or a sensation of roughness in the eyes, which causes the patient to open the lids partially, and frequently to keep them close altogether. He complains also of feelings of stiffness, dryness alternating with agglutination, heat, soreness, and intolerance of light, increased in the evenings, or when he exerts his eyes on minute objects.

Two events are apt to follow, when ophthalmia tarsi has continued long, and been neglected. The one is a partial or total obliteration of the Meibomian apertures, along the margin of one or both eyelids. These orifices are in fact skinned over. In this case, which may be regarded as incurable, the inner margin of the affected lid becomes rounded off, instead of being angular; it is smooth, red, and glistening; no Meibomian secretion is seen oozing out upon pressure, and generally the eyelashes are in a great measure awanting. The other event is lagophthalmos and eversion of the lower lid, originating in the contracted state of the skin, consequent to the healing up of the excoriated eyelid and cheek. Not unfrequently these two sequelæ go together.

Trichiasis or inversion of the eyelashes, distichiasis or misplaced eyelashes, and even inversion of the lids, must also be enumerated among the effects of long-continued ophthalmia tarsi. Those in whom the palpebral conjunctiva is much affected, or suffers from repeated ulcerations, and who acquire a habit of opening their eyes very partially, are most subject to inversion.

Constitutional symptoms. Inflammation of the edges of the eyelids is much more frequent in children than in adults. In almost every case, the patient presents undoubted marks of a scrofulous constitution; the functions of the skin, and of the digestive organs are disordered; and the general health impaired. Occasionally we find the disease associated with scrofulous conjunctivitis, enlarged lymphatic glands, swoln upper-lip, sore ears, scald head, tumid abdomen, paleness and looseness of the skin, restlessness during the night, and morning perspirations. In general, however, ophthalmia tarsi does not affect the general health in so great a degree as the disease called scrofulous ophthalmia or phlyctenular inflammation of the conjunctiva.

Causes. Ophthalmia tarsi is rarely a primary disease. It much more frequently takes its origin from catarrhal ophthalmia, ophthalmia neonatorum, or scrofulous conjunctivitis, or from the affections of the eyes attendant on measles, scarlatina, or small-pox. In all these diseases there is more or less inflammation of the Meibomian follicles, and when the other symptoms subside or totally disappear, the ophthalmia tarsi frequently remains. When this disease appears to be primary, cold, impure air, smoke, and filthiness, operating directly on the eyelids, are among the common exciting causes; while the scrofulous constitution, excited by indigestible or unwholesome food, and other causes, affords its aid in perpetuating the

complaint, or at least in favouring relapses. In adults, we often find the habitual use of wine and spirits to keep up this affection of the eyelids.

Treatment. The treatment of this disease comprehends, 1st, Such remedies as are likely to abate the inflammation, upon which the whole train of symptoms originally depends, to soothe the pain and itching, and prevent the bad effects of the gluing together of the lids; 2dly, The use of such applications, whether astringent, stimulant, escharotic, or epulotic, as may deaden the excoriated and ulcerated parts, promote their healing, or strengthen the debilitated eyelids; and, 3dly, Constitutional remedies.

1. The first direction to be given to the patient, or to his attendant, is never to attempt to open the eyes in the morning, till the concreted purulent matter is completely softened, so that the eyelids may separate without pain, and without injuring the eyelashes. For this purpose, a tea-spoonful of milk, with a bit of fresh butter melted in it, may be employed for smearing the lids, rubbing it with the finger gently along the agglutinated eyelashes. A piece of soft sponge, wrung out of hot water, is then to be held upon the eyelids for some minutes; after which the patient will find the eyelids yield, without pain, to the least effort he makes to open them. With the finger nail, the whole of the matter is immediately to be removed; and should it happen that during the day, or towards evening, there is any re-appearance of it, the same plan must again be adopted. This is absolutely necessary, because so long as the matter is allowed to remain, no application of eye-water or salve can be of any use, as it never gets into contact with the seat of the disease.

2. Occasional scarification of the palpebral conjunctiva, and the application of leeches to the external surface of the lids, and to the neighbouring skin, are to be employed, for the purpose of subduing the inflammation.

3. Advantage is derived from emollient, refrigerant, and sometimes astringent applications, in the form of fomentations, cataplasms, pledgets, and collyria.

For example, after the lids have been completely freed from their morbid secretion in the morning, they may be fomented with warm water, a warm decoction of poppy heads, chamomile flowers, the leaves of water germander, or the like; and this may be repeated once or twice in the course of the day, till the pain and principal inflammatory symptoms subside.

Cataplasms of bread and water, with a little fresh butter or olive oil, enclosed in a small linen bag, and laid over the eyelids through the night, are useful in aggravated cases. A cataplasm, made of crumb of bread and weak vinegar, is often of service. A piece of lint, spread with some soft cerate, and kept upon the eyes during the night, is useful.

When the disease is slight or incipient, an evaporating lotion proves grateful to the patient, and promotes a cure. One or two drachms of the spirit of nitrous ether, with half an ounce of vinegar,

and 8 ounces of water, frequently applied to the lids by means of a bit of sponge, will answer this purpose.

In cases of longer standing, and especially after the inflammatory symptoms are somewhat subdued, it is advantageous, repeatedly during the day, to bathe the eyelids carefully with a solution of from 1 to 2 grains of corrosive sublimate in 8 ounces of water. This collyrium may be used cold or tepid, as the patient inclines; and after the outside and edges of the lids are well soaked with it, it may be allowed to run in upon the eye, so as to come into contact with the inner surface of the lids.

Other collyria may also be employed; as a weak solution of sulphate of zinc, or a mixture of brandy and water.

4. Continued counter-irritation, by means of blisters behind the ears, or to the nape of the neck, a warm plaister between the shoulders, or a caustic issue in the neck or arm, is often attended with benefit. Indeed, it rarely happens that much good can be effected without an issue, or continued discharge, in those cases in which the lids, from long neglect, have become greatly thickened and callous.

5. The application of a salve to the edges of the eyelids at bedtime, is an essential part of the treatment. The salves which have been found most useful, are those possessed of a stimulating or slightly escharotic power, such as the red precipitate, or the subnitrate of mercury salve. The latter, commonly known by the name of citrine ointment, is prepared according to the formula in the Pharmacopœia, but is usually much reduced in strength, before being employed as an eye-salve. The former consists usually of 12 grains of red precipitate, carefully levigated into an impalpable orange powder, and mixed with 1 ounce of butter, or lard, free from salt. About the bulk of a split pea of one or other of these salves, is to be melted on the end of the finger, and rubbed into the roots of the eyelashes, and along the Meibomian apertures, every night, or every second night, according to the severity of the symptoms, and the effects produced. If much irritation follows the application of the salve, once every second night will be sufficiently often, a little simple cerate, softened by an addition of axunge, being used on the alternate nights. In some cases we are obliged to reduce the strength of the red precipitate salve, while in other instances, 20 grains to the ounce will be borne with advantage.

Some surgeons trust their patients with a very weak salve only, which is to be applied freely, by rubbing it along the edges of the lids; while, with a camel hair pencil, they themselves apply occasionally some stronger salve, such as one composed of 10 grains of nitras argenti to the ounce of soft cerate, taking care to confine the application to the diseased parts.

Salves are often employed for the cure of ophthalmia tarsi, without almost any effect, from these two necessary particulars not being known or attended to, namely, that the salve is not to be smeared over the purulent crust formed by the disease, but applied only

after the lids are freed from every particle of the morbid secretion, and that it is not to be pencilled softly on, but pressed, by repeated friction, into the diseased roots of the eyelashes, and into the mouths of the Meibomian follicles. Unless it smarts considerably, it, in general, does little good.

Other salves besides those above mentioned, are sometimes employed in this disease; especially Janin's, which consists of 2 drachms of prepared tutty, the same quantity of Armenian bole, and 1 drachm of the white precipitate of mercury, with half an ounce of lard. In old people, and in those incurable cases in which the Meibomian apertures are obliterated, this salve answers better, perhaps, than any other. The ointment of oxide of zinc, one composed of 2 drachms of burnt alum to 1 ounce of lard, and various others, have also been used. In cases supposed to be porriginous, a mixture of precipitated sulphur with diluted nitrate of mercury ointment, has been found very effectual.

Not unfrequently we meet with slight, but very irritable cases of ophthalmia tarsi, in which not even the mildest salve can be borne. Fomentations, with poppy decoction, or simply with warm water, afford most relief in such cases.

6. If small ulcers are present along the edges of the lids, they are to be touched with the lunar caustic solution, or with the solid nitras argenti. It is useful, also, to touch the inflamed conjunctiva, from time to time, with the same solution.

When the lids are greatly thickened and indurated, their edges much incrusted, and the roots of the eyelashes ulcerated, it has been recommended to extract all the eyelashes, and then touch the whole diseased surface lightly with a pencil of lunar caustic. This has a great effect in healing the ulcers and diminishing the swelling. In a few days, the caustic may be repeated. Three or four repetitions are generally sufficient. This is the practice of Quadri of Naples, who, in the interval between one application of caustic and another, bathes the parts with brandy, at first diluted, and then undiluted. He reprobates all emollient applications and salves in this disease.[3] Mr Lawrence, who also recommends the practice, states as an additional inducement to extract the cilia, that those which fall out by ulceration are never replaced, because the bulb which secretes the hair is destroyed, but when they are plucked out, they are afterwards restored. It is not, however, absolutely necessary to extract the cilia, in order to derive advantage from the application of the lunar caustic. I have frequently employed it, after having merely cleared the cilia of the morbid crust which adheres to them, and found the practice highly useful.

7. As the obstinacy of ophthalmia tarsi almost invariably depends on a faulty constitution, tonics and alteratives are always necessary. The tonics chiefly to be depended on are the sulphate of quina, and other preparations of bark, the mineral acids, the precipitated carbonate of iron, and chalybeates in general. These are to be given in appropriate doses, and continued for a length of time. A solution

of 15 grains of muriate of barytes in half an ounce of diluted tincture of bark, of which from 8 to 20 drops are given thrice a-day, in a wine-glass of water, is much recommended by Dr Zimmer of Prague, and I have witnessed good effects from it.[4]

The prinicpal alterative employed in the cure of this disease, is mercury, and perhaps the form, which on the whole is the best, is Plummer's pill. Purgatives are useful from the first, and whether alteratives or tonics are afterwards employed, a dose of laxative medicine, as sulphate of magnesia, infusion of senna, or powdered rhubarb and jalap, ought to be occasionally interposed.

8. The regulation of the patient's diet is essential for the cure of this disease. Care is to be taken that the stomach be not overloaded at bedtime, or disturbed by indigestible or improper food during the day; for, if this be permitted, the morbid secretion from the lids becomes more copious, and a greater degree of irritation and inflammation is induced.

9. The warm bath, with sea-water, if it can be had, is an excellent remedy. The vapour-bath is also useful. If neither of them can be procured, let the tepid pediluvium be employed every night at bedtime.

10. Pure air, and regular exercise, are to be recommended. Violent exercise is to be avoided, as Horace knew, himself afflicted with this disease:—

Namque pila lippis inimicum et ludere crudis.[5]

11. The clothing of those affected with ophthalmia tarsi ought to be particularly attended to. A delicate child is easily chilled. The skin, stomach, liver, and bowels are thereby disordered; and an attack of this disease, or of scrofulous conjunctivitis, is a frequent concomitant. The difficulty of curing these diseases is always increased, when the weather is damp and cold.

12. Sleep at early hours is of great consequence. Hardly any thing tends more to confirm this affection of the lids, than sitting up late at night, especially if the eyes are at the same time employed on minute objects.

Prognosis. So obstinate is ophthalmia tarsi in many instances, that we are not unfrequently asked, if it will ever be cured. The answer depends on the state of the Meibomian apertures, and on the perseverance of the patient, or his friends, in the means of cure. If, from neglect, the mouths of the Meibomian follicles, in number about 30 on the edge of each eyelid, are partially, or totally obliterated, so that the skin covering them is smooth and shining, and nothing can be pressed out from them, the case is incurable. The patient must, for life, pay attention that the lids do not get worse. He must use Janin's or some other salve, every night; and follow the general directions regarding diet, clothing, and exposure, already laid down. If, on the other hand, the Meibomian apertures are patent, however much inflamed and disfigured the eyelids are by the disease, the case is perfectly curable by perseverance; but even after the symptoms appear completely gone, the remedies will

require to be continued, for months, at least. The approach of puberty exercises its influence over this, as over other scrofulous diseases.

Sequelæ. As important effects of ophthalmia tarsi, may be mentioned, tylosis, or chronic thickening of the whole substance of the lid; lippitudo, excoriation of the edges of the lids, or blear eyes; obliteration of the Meibomian follicles, the cause of incurable lippitudo; madarosis, or loss of the eyelashes; lagophthalmos and ectropium, from the contracted state of the skin, consequent to the healing up of the excoriated lids; trichiasis, or inversion of the eyelashes; distichiasis, or misplaced eyelashes; entropium, from repeated ulcerations of the edges of the lids, and contraction of the cartilages. Several of these sequelæ I shall take up separately.

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[1] Catarrhal ophthalmia, when it affects the eyelids chiefly, is styled by some *blepharitis glandulosa;* while ophthalmia tarsi is called *blepharitis scrofulosa.*

[2] Treatise on the Diseases of the Eye, p. 339; London, 1833.

[3] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. ii. p. 380; Berlin, 1821.

[4] Ibid. Vol. xxiv. p. 156; Berlin, 1836.

[5] Horatii Sat. 5. Lib. i.

SECTION XI.—PORRIGO LARVALIS AFFECTING THE EYELIDS.

Porrigo larvalis, or crusta lactea, not unfrequently spreads to the skin of the eyelids. Infants are almost exclusively the subjects of this disease. It is characterized by an eruption of pustules, followed by thin yellowish or greenish scabs, which often intrude upon the edges of the lids, sealing them up, and preventing the child from opening its eyes. Falling off, these scabs leave the cuticle red and tender, marked with deep lines, and apt repeatedly to exfoliate. The conjunctiva sometimes takes on puro-mucous inflammation during an attack of porrigo larvalis, and occasionally the cornea gives way, and the eye is destroyed.[1] The lymphatic glandular system, in neglected cases, becomes affected, both externally, as under the jaw, and internally, as in the mesentery; diarrhœa, and hectic fever follow, and the patient perishes in a state of great emaciation.[2]

Careful ablution of the lids, with some mild and tepid fluid, as milk and water; the solution of nitrate of silver (4 grains to ʒi of distilled water) dropped on the conjunctiva once a-day; and the red precipitate salve applied to the edges of the lids at bedtime, will be found useful; with alterative doses of mercurial purgatives, followed by a course of sulphate of quina.

[1] Stenheim, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xiv. p. 75; Berlin, 1830.
[2] Bateman's Practical Synopsis of Cutaneous Diseases, p. 162; London, 1819.

SECTION XII.—ABSCESS OF THE MEIBOMIAN GLANDS.

I have already (page 143) mentioned the occasional occurrence of abscess of the Meibomian glands as an attendant on ophthalmia tarsi. Idiopathic cases of this kind are also met with, one or more of the glands being turgid with puriform fluid, perhaps without any affection of the edge of the lid, but sometimes with a swelling of its edge resembling a hordeolum. On everting the eyelid, we immediately discover the nature of the case, and the difference between it and common hordeolum. The pus sometimes oozes out at the aperture of the inflamed gland, under pressure; in other cases, the abscess requires to be opened with the lancet, on the edge or the inside of the lid. In other respects, the treatment for ophthalmia tarsi is to be followed.

SECTION XIII.—OBSTRUCTION OF THE MEIBOMIAN APERTURES.

Occasionally the external orifice of one or more of the Meibomian ducts becomes covered by a thin film, apparently of epidermis. This prevents the escape of the secretion, which, accumulating, raises up the film into a small elevation, like a phlyctenula. This does not actually cause pain, but gives rise to uneasiness in the part, when the eyelids are moved. The film is easily broken, and the accumulated secretion removed on the point of a pin.

SECTION XIV.—MEIBOMIAN CALCULUS.

Small calcareous depositions frequently take place in the Meibomian glands. They elevate the palpebral conjunctiva, sometimes penetrate it, and rubbing against the eyeball, give rise to inflammation. The conjunctiva is to be divided with the lancet, and the calculus removed with the point of a probe, or the edge of a small spatula.

SECTION XV.—HORDEOLUM AND GRANDO.

A hordeolum, or stye, is a furunculus or little boil, projecting from the edge of the eyelid. According to some, it implicates merely

the cellular tissue at the margin of the eyelid; but Dr Zeis suspects[1] that it has its seat in the capsule and glands of the roots of the cilia. Certainly it is not an abscess of the Meibomian glands.

Symptoms. The swelling is of a dark red colour, very hard, attended at first by itching, and afterwards by a great degree of pain in proportion to its small size. The tension and exquisite sensibility of the skin which covers the edge of the eyelids, serve to explain the vehemence of the pain. The inflammation spreads, in some degree, to the conjunctiva, and the motions of the lids are impeded. In delicate irritable subjects, fever and restlessness are excited. The swelling suppurates slowly, and at last points and bursts. After discharging a small quantity of thick pus, and sometimes a little disorganized cellular membrane, it subsides and disappears. If Dr Zeis be correct, the disorganized substance which is discharged, must be the bulbs of the cilia. The cilia fall out from the part affected, but are generally reproduced. If a hordeolum heals up without having completely discharged itself, it is apt to return, or to degenerate into a hard white tumour, called grando, from its resemblance to a hailstone, which having once formed, shows no disposition to undergo any farther change. Grando also results occasionally from an indurated hordeolum which has not advanced to suppuration.

Causes. Hordeolum is most frequent in scrofulous subjects. It frequently depends on late hours, the use of spirituous liquors, or on disordered bowels.

Treatment. In the incipient stage, cold applications are to be used, as vinegar and water, solution of acetas plumbi, or an iced poultice. If suppuration appears to be advancing, a warm bread and water poultice, enclosed in a little bag of linen, or a roasted apple poultice, is to be applied. If slow of bursting, the abscess may be opened with the point of a lancet. The pus and destroyed cellular membrane are to be pressed out, and the poultice continued. It sometimes happens, that the sloughy cellular membrane is slow of coming away, in which case the cavity may be touched with a pointed piece of lunar caustic, after which it soon closes.

In the commencement of hordeolum, an emetic, followed next day by a purge, will be found useful.

To those who are liable to frequent attacks, we must recommend temperance, and early going to bed.

Grando is commonly single; in other cases, there are several tumours of this sort even on the same eyelid. Attempts to discuss them by promoting absorption, are generally fruitless; but occasionally by friction, or by the application of stimulating salves, they are induced to suppurate. The best plan of treatment, is to lay the grando open with the lancet, press out its contents, and touch the interior with the lunar caustic pencil.

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[1] Ammon's Zeitschrift für die Ophthalmologie; Vol. v. p. 220; Heidelberg, 1836.

SECTION XVI.—PHLYCTENULA AND MILIUM OF THE EYELIDS.

Semitransparent vesicles, or phlyctenulæ, filled with watery fluid, are frequently observed on the edges of the eyelids, especially at the inner canthus, sometimes single, often in groups, varying in size from that of a mustard seed, to that of a pea. Having been punctured with the lancet, they are to be laid hold of with a pair of hooked forceps, and snipped off with the scissors.

Small white tumours, like millet seeds, containing a suet-like substance, are often observed between the Meibomian apertures and the cilia. They are to be opened with the point of the lancet, and their contents pressed out.

SECTION XVII.—WARTS ON THE EYELIDS.

Warts are not uncommon on the external surface of the eyelids, and sometimes grow from their edges. Keeping the excrescence constantly covered with a piece of lint, saturated with a decoction of tormentil root, will sometimes serve for its removal. But if this does not succeed, the wart is to be tied with a waxed silk thread, close to its root; or, if it has a broad attachment, it is to be destroyed by the application of lunar caustic.

SECTION XVIII.—TUMOURS IN THE EYEBROW AND EYELIDS.

The eyebrow and eyelids are the occasional seats of various kinds of tumours. We shall turn our attention first to those which are common in their occurrence, then to those which are rare.

§ 1. *Chalazion*,[1] *or Fibrinous Tumour.*

This extremely common disease bears some resemblance to a hordeolum, but it is not situated on the edge of the lid, nor does it point towards the edge. It is generally placed at some distance from it, and when it comes to point, it does so generally towards the internal, rarely towards the external surface of the eyelid. It is situated either between the orbicularis palpebrarum and the tarsus, or in the substance of the cartilage itself. The tumour is at first moveable; but, as it enlarges, it becomes fixed, and the skin covering it grows red. On everting the lid, we find its inner surface inflamed, and often depressed, even in the early stage. After the disease has continued for a considerable time, that portion of the cartilage which lies behind the chalazion becomes thinned by absorption, and we find a small fungus-like substance projecting

through the cartilage and palpebral conjunctiva, at the point which had previously been depressed. In one case, I found the fungous growth making its way through the upper punctum. A chalazion often goes on to suppurate, or rather suppuration takes place round the tumour, and at length the tumour is destroyed by this process, the abscess evacuating itself, in some cases on the outside, and in others on the inside of the lid.

Chalazion is met with more frequently in the upper than in the lower eyelid. Sometimes it occurs in both at the same time. In some cases, there are more than one in the same lid. It is very rarely seen in children.

The digestive organs of those who are troubled with chalazia, are generally in bad order; the stomach acid and flatulent; the bowels slow, and the stools morbid. In incipient cases, the farther progress of the tumour may often be checked by alterative doses of the blue pill, and by the use of laxatives, and tonics, especially bark and steel. Under this treatment, I have seen many such tumours disperse entirely. A vinegar poultice, in a small linen bag, continued every night, sometimes proves useful; as well as friction over the tumour, with camphorated mercurial ointment, for ten minutes twice a-day.

Should the chalazion still continue, it is necessary to remove it by operation. As the tumour is unencysted, it is needless to think of a regular extirpation. If this be attempted, the operator is very likely to be foiled, as the tumour eludes dissection; or if he still persists, he may extirpate perhaps a piece of the cartilage, and leave the lid with an opening through it, like a button-hole. All that is necessary, in general, is to evert the affected lid, puncture the tumour freely with the lancet pushed through the cartilage, and press out the gelatinous-like contents. The cavity where the chalazion was lodged, immediately fills with blood, keeping up an appearance as if the tumour was still there, although lessened in size; but gradually the swelling, redness, and other signs of the disease, go off entirely. In some few cases, it may be proper to perform this operation through the integuments; but, in general, the tumour lies nearer the inner surface of the lid. If the chalazion threatens to burst through the cartilage, or if there is already a little opening with a small fungous protrusion, the incision ought to be made in the line of this protrusion, and not to one side of it, even though the tumour is more prominent where the cartilage is still entire. It is much easier to press out the chalazion through the thinned part of the tarsus, than elsewhere. Sometimes two chalazia, sitting close together, appear as one; but require two separate incisions for their removal.

By the operation above mentioned, the chalazion, if not in a state of suppuration, is generally removed entire. It is of a light reddish colour, and a gelatinous consistence, with spots of blood through it. Becoming white and opaque on being immersed in diluted alcohol, dissolving with great ease in acetic acid, and being thrown down

by prussiate of potash, it seems to consist of an imperfect fibrinous matter.

§ 2. *Albuminous Tumour.*

The albuminous tumour of the eyelids occurs much more frequently in children than in adults. It is seated between the skin and the orbicularis palpebrarum; sometimes close to the edge of the eyelid, but generally at some distance from the edge. The integuments covering the tumour are of a white colour, or rather are so thinned as to allow the white colour of the tumour to shine through. It presents a granulated appearance even before extirpation; and, on being removed, is still more distinctly seen to be formed of numerous grains or smaller tumours, which are probably enlarged sebaceous glands. These are white and opaque, and the whole tumour is firm, free from pain, unencysted, and not apt to go into suppuration. Neglected, this sort of tumour sometimes reaches the size of a filbert. The integuments are now apt to become ulcerated, and the mass is discharged entire, or in portions from time to time. The eyelids often present numerous albuminous tumours, and sometimes they are scattered over the other parts of the face.

Chemical examination of the tumour shows it to possess the characters of coagulated albumen.

If albuminous tumours of the eyelids be dependant on any constitutional cause, they are of scrofulous origin. I have seen a crop of them disappear from the eyelids of a scrofulous child, during the use of the sulphate of quina. In general, however, we are obliged to extirpate them, by a transverse incision through the integuments, and through the middle of the diseased mass. By firm pressure, we are then able to bring away the tumour entire, without any farther dissection.

§ 3. *Encysted Tumour.*

Encysted tumours, consisting of sebaceous glands enormously distended, and filled with suety substance, rarely occur in the eyelids. Congenital tumours of this kind, however, are not unfrequently met with, close to the outer angle of the eyelids, or above the eyebrow. Their fatty contents are sometimes mixed with short hairs. They lie under the orbicularis palpebrarum, and often adhere to the bone, so that, when we proceed to their extirpation, it is necessary to make a larger incision than the size of the tumour might seem to require, and to dissect carefully round and under the cyst. When seated in the eyelids, the cyst is often very delicate, so that it is difficult to remove it entire. A rounded knife answers better for the extirpation than a pointed one.

Instead of attempting a regular extirpation, it may sometimes be advisable merely to lay open the cyst with the lancet, squeeze out its contents, and introduce into its cavity for a few seconds a pencil of lunar caustic, or pure potash. After a few days, the cyst comes away, and the wound heals up. Or, the tumour may be divided into two halves, the contents removed, and the cyst allowed to collapse;

then, with a pair of forceps, the one half of the cyst is to be laid hold of, drawn out through the wound, and snipped off with scissors, and the same with the other half. If any part of the cyst is left, the wound will not close, or is apt to open again, after being healed, and continue for a length of time to discharge matter. Should this take place, it may be proper to make an incision, and remove the bit of the cyst which had been left at the former operation.

Simple puncturing of encysted tumours does not answer well, as it is apt to excite inflammation in the neighbouring cellular membrane, and lead to fungous growths from the cyst.

§ 4. *Sarcomatous Tumour.*

Case 120.—A moor, 24 years of age, applied at the French Hospital at Algiers, on account of an enormous nodulated tumour in the right upper eyelid, of several years' standing, the origin of which he attributed to a blow with a stick. The tumour hung down so far, that the cilia were nearly on a level with the chin; it rose in relief above the prominence of the nose, and measured 6 inches in its vertical diameter, and 5 in its transverse. The upper part of the tumour passed into the orbit, and adhered to the globe of the eye, which was partially atrophied, with its cornea opaque. When the tumour was raised, however, the patient appeared to discern the light.

The patient was much harassed by this morbid growth; it deranged his whole system, disturbed his nutrition, and had reduced him to a state of great emaciation. M. Baudens, the surgeon of the hospital, explained to his colleagues how he should dissect out the tumour from below upwards, leaving a sufficient portion of integuments to supply the loss which the conjunctiva would suffer, and avoiding in his operation the orbicularis palpebrarum, the levator palpebræ superioris, and the cartilage of the lid. His opinion was adopted; but the operation was more troublesome than he had calculated, chiefly from the unmanageableness of the patient.

The nodules of the tumour were interspersed among the fibres of the orbicularis palpebrarum; and the operator felt his difficulties augmented when he came to separate the diseased structure from the eyeball, which he was most desirous not to injure. He contrived to manage it, by using his forefinger as a guard between the eye and the tumour; and syncope having come on, he availed himself of the moment to dissect the integument, which he wanted for the new eyelid. To this he attached the edge of the old eyelid, by a few stitches, thus preserving the cilia. Simple dressings were then applied. In 24 hours, the sutures were removed, the cicatrice being consolidated. In eight days, the patient was almost quite well. In the course of two months the cornea recovered a great part of its transparency. The lid could be raised and depressed, and its dimensions nearly corresponded with those of the opposite side.

As to the tumour, it was found strongly imbedded in a fibrous envelope, several lines in thickness. It weighed 15 ounces, and resembled, in every respect, a mass of pale fibrin, such as is obtained from abstracted blood. A number of little serous cysts were seated in its centre.[2]

Other tumours, still, might be described; for example, neuroma, or painful subcutaneous tubercle, fungus hæmatodes, and melanosis.[3] But I think it unnecessary to enter on the particular consideration of these diseases when found affecting the eyelids.

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[1] From *χάλαζα, hailstone.*

[2] Baudens, Clinique des Plaies d'Armes à Feu; p. 168; Paris, 1826.

[3] Edinburgh Medical and Surgical Journal; Vol. xxxviii. p. 324; Edinburgh, 1832.

SECTION XIX.—TYLOSIS, OR CALLOSITY OF THE EYELIDS.

There are three varieties of thickening and induration of the eyelids, which merit attention; namely, the scrofulous, the arthritic, and the scirrhoid.

1. The first of these arises, as has been already (page 143) explained, from neglected ophthalmia tarsi. A caustic issue in the nape of the neck is the best remedy for this, the *scrofulous tylosis*, added to the ordinary treatment of inflammation of the edges of the eyelids.

2. *Tylosis arthritica* rarely occurs, except in those whose digestive organs are deranged by the habitual use of ardent spirits. It is attended with redness, attacks generally the upper eyelid, and seems to have its chief seat external to the cartilage. The whole length of the eyelid is commonly affected; but in some cases, merely a part, and that not unfrequently the neighbourhood of the papilla lacrymalis. Occasionally the Meibomian glands are evidently enlarged; and sometimes the disease is combined with chalazion. I have never seen this variety of callosity end in suppuration or ulceration. It slowly increases, and then becomes stationary. The patient complains of thirst, acidity, and want of appetite. The application of leeches, friction with camphorated mercurial ointment, the use of laxatives, and the exhibition of alteratives internally, I have sometimes found successful, but more frequently fruitless in this complaint.

3. *Tylosis scirrhoeides* attacks the lower lid more frequently than the upper, affects more the inner than the outer surface of the lid, is of a white, or slightly yellow colour, more or less tuberculated, and apt to end in ulceration. From its appearance, (*Fig.* 12) its occurring generally in old people, its intractable nature, and its ending in ulceration, it is liable to be confounded with scirrhus, with which, however, it is by no means identical.

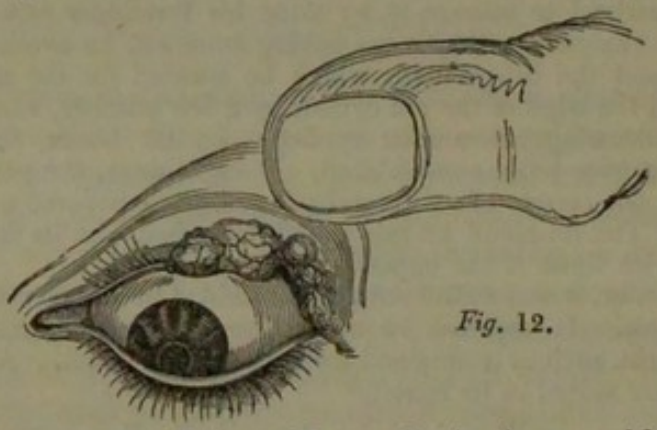

Fig. 12.

I have watched some cases of this variety of callosity for a number of years, and although the induration and swelling did not subside, yet, by care to avoid injuring the part, using the red precipitate ointment to the edges of the lids, and applying lunar caustic solution to the ulcerated points, the complaint has been kept at bay, and the operation of removing the affected part avoided. Fowler's

solution, internally, has appeared to assist in checking the progress of this complaint.

Although sometimes successful in warding off the progress of the disease, in other cases the tumour has caused such irritation of the eye, increased so much in size, and produced so much deformity, as to warrant extirpation of the indurated portion. This I did in the instance figured above. In none of the cases in which I have operated, has there been any relapse.

The induration may be so extensive that almost the entire eyelid will require to be removed. This may be done to the lower lid without much injury to the eyeball, the divided integuments coalescing with the conjunctiva; but the loss of the upper lid is likely to lead to a callous state of the investing membrane of the eyeball, opacity of the cornea, and loss of vision.

SECTION XX.—NÆVUS MATERNUS, AND ANEURISM BY ANASTOMOSIS,[1] OF THE EYEBROW AND EYELIDS.

Mother's mark, or nævus maternus, occurs not unfrequently on the eyelids. It is sometimes but little raised above the level of the integuments, through which there appears a collection of dilated blood-vessels. In other cases, the nævus is prominent, of a deep red colour, smooth like a cherry, or granulated like a raspberry. Some nævi, though vivid at birth, gradually fade and disappear; some remain stationary through life, although varying in intensity of colour at different seasons, and according to the different degrees of activity in the circulation; while a third set begin to grow, either immediately after birth, or from incidental causes at a subsequent period, and from small beginnings, become large and formidable vascular tumours, partaking of the nature of the disease first accurately described by Mr John Bell, under the name of aneurism by anastomosis, readily bursting, and giving rise to impetuous and alarming hæmorrhages, which, if they do not prove suddenly fatal, materially injure the health by frequent depletion of the system.[2]

There appears sufficient ground for believing, that anastomotic tumours, whether *congenital* or *acquired*, consist of dilated capillaries, and that, in some cases, these are chiefly *venous*, and in others chiefly *arterial*. Nævi of the latter sort are characterized by their vivid colour, high temperature, rapid and dangerous course, continual and distinct pulsation, and the great dilatation, tortuosity, and violent throbbing of the arteries which feed them; while the former are livid, cold, without pulsation, and slow in their progress. Both, however, are subject to become suddenly tense, as if ready to burst, when the patient is exposed to much heat, indulges in violent exercise, or is under the influence of mental excitement. The terms *venous* and *arterial*, may be incorrect; for we are, as yet, in

ignorance of the real structure of aneurism by anastomosis, and therefore cannot pretend to explain its varieties. The appellations *active* and *passive* seem less objectionable. The passive communicate a peculiar dough-like impression when laid hold of with the fingers, yielding slowly to pressure, till they seem empty and flaccid, then filling up almost immediately to their former size; the active, on being moderately pressed, give the impression of a violent pulsatory movement, and can scarcely be emptied by the pressure of the fingers.

Another distinction of some importance is that of *cutaneous* and *subcutaneous* nævi. In the former, the tumour appears to be seated entirely in the skin; while in the latter, the integuments can be pinched up from off the tumour, and do not seem to be in themselves affected.

In the eyelids, there occur both venous or passive, and arterial or active nævi; both cutaneous, and subcutaneous. In one case, which I saw, the tumour was most prominent on the conjunctival surface of the lid; and it sometimes happens that the disease does not affect the lids merely, but stretches deep into the orbit. A nævus on one or other eyelid may be at birth no bigger than a pin's head; but in a month's time may spread to the third of an inch in diameter. Not unfrequently we meet with a small nævus on the lids, and one or more larger ones on the scalp, trunk, or extremities.

It is not to be denied, that nævi, and especially those of the venous sort, after having increased to a certain degree, sometimes cease to enlarge, and thenceforth continue stationary, or gradually wither and contract till scarcely a vestige remains. In some cases, ulceration and sloughing occur spontaneously in these growths, destroying them in part, consolidating the remainder, and preventing them from increasing. In other cases, some very slight cause of irritation, as a trifling bruise, will excite a mere stain-like speck, or a minute livid tubercle, into an uncontrollable state of diseased action. The passive nævus has been known to assume the character of the active, and *vice versa*.

Treatment. Various methods of treating nævus or aneurism by anastomosis have been adopted. The principle of some of them is the obliteration of the disease by inflammation; that of others is the total destruction or removal of the tumour. Our choice should be regulated by the situation of the growth, its size, and its degree of activity. Other things being equal, the methods which leave the skin entire, so that no ectropium is likely to ensue, claim a preference when the disease is seated in the eyelids.

1. *Pressure and astringent lotions.* A moderately sized nævus above the eyebrow, or in any other situation permitting it to be emptied by pressure against a subjacent bone, may, in general, be cured by continuing the pressure methodically. Boyer relates the case of a child, of two years of age, with this disease in the upper lip, the cure of which was effected by perseverance in this plan of treatment. The nævus extended from the adherent edge of the

lip, under the nostrils, and into the septum narium, so that a complete extirpation being, in Boyer's opinion, impossible, he advised the mother to bathe the tumour with alum water, and with her forefinger placed transversely under the nose, to compress the part as often as she could. This advice was followed with a degree of constancy which maternal tenderness only could have accomplished. The mother sometimes passed seven hours continuously, in pressing the tumour with her finger; and this assiduity was attended with such complete success, that ultimately no trace of the disease remained.[3]

Mr Abernethy, after mentioning the particulars of an aneurism by anastomosis on the forearm, cured by permanent and equal pressure, and by keeping low the temperature of the limb, relates the following case:—

Case 121.—A child had this unnatural state of the vessels in the orbit of the eye. They gradually increased in magnitude, and extended themselves into the upper eyelid, so as to keep it permanently closed. The clustered vessels also projected out of the orbit, at the upper part, and made the integuments protrude, forming a tumour as large as a walnut. The removal of this disease did not appear practicable, and pressure to any extent was evidently impossible; but the abstraction of heat, and consequent diminution of inflammatory action might be attempted. Mr Abernethy recommended that folded linen, wet with rose water, saturated with alum, should be bound on the projected part, and kept constantly damp.

Under this treatment, the disorder as regularly receded as it had before increased. After about three months, the tumour had gradually sunk within the orbit, and the child could open its eye. Shortly afterwards all medical treatment was discontinued, and no appearance of the unnatural structure remained.[4]

The plan of treating nævus on the eyelids, by pressure and astringents, rarely succeeds, and the delay occasioned by giving it a trial, may prove highly detrimental. When a cure does follow this plan of treatment, it is probably accomplished more by nature than by the artificial means employed. In one case, in which I used a saturated solution of alum, this fluid, by getting into the eye, occasioned a pretty severe puro-mucous ophthalmia. Brandy is said to have been tried with good effect, as an astringent application.

2. *Vaccination.* Small cutaneous nævi, in their early stage, have sometimes been cured by the application of vaccine lymph. The principle upon which this method of cure depends, is the destruction, by suppuration, of the cellular substance surrounding the anastomosing vessels, thereby insuring the obliteration of the vessels themselves. With a lancet already charged with the recent lymph, slight scratches are to be made upon the surface, and round the circumference of the nævus, at regular distances from each other. As soon as the bleeding has ceased, additional lymph is to be introduced; and then over the whole surface of the tumour, a bit of linen, saturated with the same fluid, is to be applied, and retained for several hours. In the usual time, the vesicles appear. Each vesicle produces a degree of inflammation, which induces an occlusion of the næval cells and vessels only to a certain distance around it; and therefore it is necessary to inoculate the surface of the

tumour at such close distances that the whole tumour may be involved in the inflammation. In favourable cases, the tumour gradually subsides, leaving scarcely any mark behind. Not unfrequently the cure is effected, however, only after a very tedious festering and ulceration. If the child has been vaccinated in the common way, previously to the nævus attracting much notice, this plan of cure will rarely succeed; and even in children not previously vaccinated, it sometimes fails to accomplish the object intended.[5]

3. *Stimulants and escharotics.* When vaccination has failed, or vaccine lymph cannot be procured, some other stimulating fluid may be tried, inserting it into the nævus in the same way as we do the lymph. A strong solution of tartrate of antimony may be used for this purpose; or a pustular eruption, affecting the nævus to a sufficient depth, might probably be excited by rubbing it with tartrate of antimony ointment, or covering it with an antimonial plaister. It is likely that the vaccine lymph produces no specific effect upon this sort of tumour, but operates merely by the inflammation which it excites, and that any other stimulant of proportionate energy, and applied with equal care, would be followed by nearly the same result, especially if the disease were merely cutaneous.

More powerful substances, both fluid and solid, have been used as escharotics, by which to destroy the organization of nævi. Some employ nitric acid; others lunar caustic. Dr Ammon touches the tumour from time to time with a solution of the nitrate of mercury in nitric acid.[6] Mr Wardrop has repeatedly employed pure potash, applying it to the nævus so as to produce an eschar. In some instances, the eschar, on falling out, has been found to comprehend the whole diseased mass; while, at other times, the separation of the eschar has been followed by ulceration, which destroyed the remainder of the tumour.[7] These were cases, we may presume, of the subcutaneous kind. The potash is to be rubbed only on the centre of the tumour. Ulceration follows, and spreads, destroying the nævus. A poultice is applied, the parts fall out, and cicatrization takes place. The potash may require to be applied, however, four or five times before the object is obtained.

4. *Injection of stimulating or escharotic fluid.* Mr Lloyd[8] proposes to inject into the substance of the nævus some stimulating, or even escharotic fluid. He tried a mixture of the spirit of nitrous ether with nitric acid. By repeated injections, one portion of a large nævus on the face and eyelids was destroyed; but the child took measles before the cure was completed, and died. The injection did not enter very readily; therefore much could not be accomplished at once. In another case, it passed freely into the substance of the nævus, and five injections accomplished a cure. The effect of the injection was hardening of the part into which it entered; and as the hardness subsided, the disease disappeared.

The point of the syringe should be introduced through an aperture in the skin, at some little distance from the disease, as there is then greater facility in compressing the nævus, so as to prevent

hæmorrhagy. Before injecting it, the nævus should be compressed, so as to empty it of its blood, and the pressure should be continued till the instant when the fluid is projected by the syringe. The fluid should be retained in the nævus from five to ten minutes, by making pressure along the track which had been occupied by the tube of the syringe.

Mr Lloyd warns us to make pressure around the nævus during the act of injection, lest the fluid be forced into the contiguous cellular tissue, where it might excite inflammation. For making the pressure, he recommends the cover of a pill-box, with a notch in it for the passage of the point of the syringe.

A much more serious accident, however, than the injection of the cellular tissue is apt to attend this method of treating nævus; namely, the passage of some of the fluid into the veins, and thence to the heart. There is strong reason to suspect that this was the cause of instant death in a child nearly two years old, in whom a nævus, situated over the angle of the jaw, was injected with diluted aqua ammoniæ.[9]

5. *Actual cautery.* Another mode of producing inflammation, and obliterating the vessels of the tumour, is by the actual cautery. A number of long sewing needles are heated to a white heat. These are pushed across the tumour in different directions, so as to cauterize every part of it.[10]

6. *Incision of the vessels within the tumour.* The danger of hæmorrhagy from excision, the pain of the ligature, and the extensive scar left by vaccination, induced Dr Marshall Hall to consider whether some less objectionable operation might not be devised for the cure of nævus. Accordingly he proposed to introduce a couching needle with cutting edges, at one point of the circumference of the nævus, close by the adjoining healthy skin, and from this point to pass the instrument through the tumour in eight or ten different directions. The first puncture, the only one through the skin, is to be made in the centre of the several rays of incisions, which are effected by merely withdrawing, and again pushing forward the instrument. This operation was tried, under Dr Hall's direction, in a case of oval nævus, rather larger than a shilling, the situation of which, however, he does not mention. After the incisions were made in the manner described, a little pressure was applied on the tumour, by means of strips of adhesive plaister. There was no pain, nor hæmorrhagy. Dr Hall expected that inflammation would take place, and that a cicatrice would be formed, which, from its solid texture and progressive contraction, would obliterate the tumour. For several weeks there was little or no change. Indeed it was almost concluded that the plan had failed. What a short time, however, did not effect, a longer period accomplished completely. Half a year after the operation, the tumour was found to have disappeared, and the colour of the skin to be nearly natural. The skin itself was perfectly preserved, free from any appearance of scar.

Dr Hall observes that this operation might be repeated at longer or shorter intervals, and with more or fewer punctures, according to the degree of inflammatory action necessary for the obliteration of the nævus. He points out the appropriateness of such a mode of cure when the disease affects the eyelids, where pressure is inapplicable, and the loss of integument is, if possible, to be avoided. He adds that pressure forms no necessary part of the treatment; and that the cure in the case detailed was gradually effected, long after pressure had ceased to be employed.[11]

7. *Seton.* The cure of nævus by the passage of a seton through the tumour, as proposed by Mr Fawdington, of Manchester, is tedious, and scarcely less painful than extirpation by the ligature. The seton has been tried only in venous cases, and it would seem unsafe to venture on this plan of cure if the nævus were arterial. The saving of deformity is the great recommendation of the seton, its use being followed by considerably less disfigurement than that which must attend the destruction of the tumour, either by caustic or the ligature. Instead of leaving a large cicatrice, as must be the case where the latter remedies are employed, the greater portion of the integuments covering the tumour is preserved, nearly as entire as in Dr Hall's mode of cure; little more than the scars produced by the needle remains; and hence the deformity is really trifling, a matter of great importance where the eyelids are concerned.

In employing the seton, it is necessary to secure two material objects; namely, the suppression of hæmorrhagy from the vessels divided by the needle in the first instance, and subsequently a degree of irritation sufficient to excite inflammation and suppuration throughout the diseased mass. The first of these objects is to be accomplished by using a skein of spongy cotton thread, large enough fully to occupy the aperture made by the needle; and the second, by using a needle that will admit, relatively to the dimensions of the tumour, a seton of considerable proportions. If, however, the irritation falls short of the proposed object, easy means are afforded, by the newly established channel, of applying other irritants, or even caustic, to the residue of the morbid growth, without destroying the integuments.

Case 122.—Elizabeth Tetlow, a vigorous-looking child, 10 months old, had a small subcutaneous nævus on the forehead from birth, which for two months had shown a disposition to grow, and on the 12th of February 1827, occupied the left half of the front, encroaching on the eyelid, and extending over the anterior half of the corresponding parietal bone. The nævus presented the purely venous character; there was neither excitement nor enlargement of the neighbouring arteries, nor pulsation in the tumour. It presented the usual leaden colour, with large veins running towards and over its surface. It admitted of being reduced by compression, and evidently swelled under any exertion of the child. The cutis in no degree participated in the disease, and though the upper lid was so far involved in the growth that it could not be voluntarily raised, yet so nicely was the swelling defined, and so strictly limited to the subcutaneous cellular tissue, that on elevating the lid in a way to expose the conjunctiva, no vestige of the peculiar structure became apparent.

The seton was passed through the long diameter of the tumour, with the usual

precautions. The effects being less severe than might have been wished, it being only in the immediate neighbourhood of the seton that the diseased mass became destroyed, the seton was retained for nearly three weeks. Immediately after withdrawing it, a strong solution of sulphate of copper was injected into the channel it had left; and this was followed by a degree of inflammation through the tumour, which it was hoped would entirely obliterate it. After a copious discharge, however, which came on about the third day, and continued more or less for a fortnight, the inflammatory intumescence subsided, and left the lateral portions of the nævus seemingly in their original state. Mr Fawdington now passed a thick skein of thread in a transverse direction, which at the usual time produced the wished-for degree of irritation, and subsequent discharge from the orifices. But after a fortnight, when the seton was removed, it was found that the lower and inner division of the tumour had not been completely destroyed. It appearing advisable, therefore, to employ a more direct method of accomplishing this, Mr Fawdington again availed himself of the channel caused by the seton, passing through it a cylinder of nitrate of silver, which he pushed forwards into the remainder of the diseased growth, where it was suffered to continue about a quarter of a minute. In two days, a considerable degree of inflammation was excited, not only in the part to which the caustic was applied, but also in the whole site of the original tumour, which occasioned the fear that extensive suppuration, or even sloughing would occur. By soothing applications, this was averted.

The parts remained for some time greatly indurated, the induration being accompanied by chronic inflammation; which conditions were relieved by occasional leeching and evaporating washes. During the latter period of the treatment, the constitution was slightly disturbed.

At the expiration of three months, every trace of the disease had disappeared, and the parts had almost regained a healthy aspect, with the exception of the palpebral conjunctiva, which, from having been involved in the spread of inflammation occasioned by the caustic, had become granular and thickened, so as to require excision. The surface, indeed, where the tumour had been situated, appeared fuller than on the opposite side; the veins in the vicinity remained more dilated than natural; and the eyelid did not admit of being completely raised. The only cicatrices were those left by the apertures of the seton, which were by no means conspicuous; and upon the whole, the disfiguration was unimportant. By the 7th May 1830, the eyelid had not entirely regained its natural appearance, being still a little thickened, and incapable of being fully elevated; yet it could be sufficiently raised for the ordinary purposes of vision. The cicatrices were still more contracted and less visible, the upper and outer being concealed by the hair, whilst those exposed to observation were not more offensive to the eye than the scar left by the variolous pustule.[12]

Mr Fawdington observes that though the seton in this case was not competent in itself to cure the nævus, yet, it must be confessed, it contributed in a principal degree to that end, and afforded an opportunity of modifying the application of caustic in such a way as to preserve the integuments. It is obvious from the situation and dimensions of the tumour, that neither ligature, excision, nor caustic in the usual way of employing it, could have been judiciously adopted; for, independently of the risk of hæmorrhagy, and the deformity which would have been occasioned, the particular functions of the parts implicated, especially of the eyelid, would have been essentially impaired. Though the progress of the cure was tedious, and the little patient at one time apparently in hazard from excessive inflammation, the result upon the whole was gratifying, and the case instructive, as it taught the fact, that caustic applied internally to the morbid growth, does not necessarily involve the destruction of its integuments. At the same time, we should be cautious in the use

of this remedy, which is intended to act not so much in directly disorganizing the diseased texture, as in exciting a degree of inflammation, by which its obliteration is to be effected.

8. *Ligature.* One mode of using the ligature in cases of cutaneous nævus, is the following :—The tumour being laid hold of with the finger and thumb, so as to raise it as much as possible from the proper substance of the lid, two or more straight needles are passed under it, so as to intersect each other ; the ligature is then placed around the base of the tumour, under the needles, and is drawn tight.

Another method is, to pass a curved needle, armed with two strong waxed linen threads, through the base of the tumour, so as to divide it into two portions, each of which is to be grasped by its own ligature. If the tumour is very large, it may be divided into four portions, by passing the needle, armed as before, a second time, but at right angles to its first direction. The ligatures are to be drawn tight, and secured by a double knot. If any part of the tumour slips from the grasp of the ligature intended to embrace it, a needle must be thrust under that part, and held there till the knot is tied.

In the course of 48 hours, the tumour will have entirely lost its vitality, so that it may be sliced off, and the ligatures removed ; or it may be left, till it turns black, shrivels, and falls off, which, in nævi of the eyelids, generally happens in five or six days. A poultice is then to be applied, and continued till the exposed surface granulates and heals. Some very extensive and irregular nævi, stretching over the neighbouring parts as well as the eyelids, may require more than two ligatures.

If the nævus is entirely subcutaneous, the skin may be divided and turned aside, so as to expose the tumour, to which the ligatures are then to be applied.

I may here notice M. Lallemand's modes of treating nævus. He sometimes inserts a number of pins into the tumour, without transfixing it, and twists a waxed thread around the pins. They are removed in seven or eight days, or when they are thought likely to have excited sufficient inflammation to consolidate the morbid structure. In other cases, he makes an incision through the whole substance of the nævus, and immediately unites the two lips of the wound by needles and the twisted suture. The inflammation and the cicatrice which follow, obliterate the tumour.[13]

9. *Excision.* Nævi and anastomotic aneurisms have occasionally been removed by excision. This is an effectual, but by no means a very safe mode of cure. When the morbid growth itself is cut, a powerful gush of arterial blood takes place, which can hardly be restrained, and although the knife keeps clear of the tumour, there is, in general, very serious hæmorrhagy, so that in removing even small nævi in this way, alarm has justly been excited for the life of the patient, and the recovery of strength and colour has been very tedious.

Case 123.—A gentleman, of about 25 years of age, had an aneurism by

anastomosis upon his forehead. It began with a small spot like a pimple, of the size of a pea, and was, when he consulted Mr John Bell, of the size of an egg. It was seated close upon the eyebrow, and at its commencement was so small, and so little troublesome, that it was believed to be a pimple, brought on by a tight hat. When it had attained the size of a sparrow's egg, the patient thought he felt occasional pulsation in it. He consulted a surgeon, who found the pulsation distinct, pronounced it to be an aneurism, and advised that it should be cut out. The patient delayed, and was recommended by some one to try pressure. This producing pain but no good effect, he let the aneurism grow for five years.

An operation was now decided on. The tumour appeared to derive its blood from two arteries; one, a branch of the temporal, enlarged and tortuous, which passed into the upper end of the tumour, while the other, coming from within the orbit, entered the lower end. These two arteries and the intermediate tumour beat in concert, and very strongly. Under the apprehension that the disease was merely an enlarged artery, the surgeon first passed a ligature round the arterial branch coming from the orbit, and tied it; but this did not abate the pulsation of the aneurism. He next tied the temporal branch, but the pulsation remained unaffected. The tumour was then laid open in its whole length. It bled very profusely. A needle, armed with a ligature, was stuck into its centre, where there was one artery larger than the others; but from all the rest of the surface there was one continual gush of blood. The hæmorrhagy was repressed, and the wound bound up with a compress and bandage. It healed slowly, the ligature came away with difficulty, the pulsation began again, and by the time the wound was healed, the tumour was as large as before the operation.

For nine months the patient allowed the disease to go on unmolested, and then consulted Mr Bell. The tumour was of a regular oval form, and across the middle of it ran the scar of the operation. The spot was not purple on its surface, but was covered by a firm, sound skin. The two arteries were felt pulsating with great force; and when the patient was heated, stooped, or breathed hard, the pulsations became very strong. By this time it was affected also with pain. Mr Bell knew, that if he cut within the active circle of the tumour, he should have innumerable blood-vessels to contend with. He therefore resolved to cut out this aneurism, not to cut into it. He made an oval incision, which comprehended about a fourth part of the surface of the tumour, dissected the skin of each side down from it rapidly, went down to the root of the tumour, and turned it out from the bone. It bled furiously during the operation, but the moment it was turned out, the bleeding ceased. The two arteries were tied, the eyebrow was brought nicely together, and the incision healed in 10 days. The tumour appeared a perfect cellular mass, like a piece of sponge soaked in blood.[14]

This, then, is a striking example of the subcutaneous arterial aneurism by anastomosis, and of the mode of cure by excision. The following case, related by Mr Allan Burns, furnishes an instance of the cutaneous and venous variety of nævus.

Case 124.—A middle-aged stout man, presented a large, livid, compressible tumour, in the vicinity of the right orbit. The swelling had existed from birth, was sometimes more distended than at others, but was seldom productive of pain, except when injured, on which occasion it poured out a considerable quantity of fluid blood. It never pulsated; but during exertion, or walking in a very hot or very cold day, it became exceedingly tense. Externally it covered about one third of the temporal extremity of the upper eyelid, and it occupied the whole extent of the lower one, the folds of which were separated to such an extent, as to produce an unseemly, irregular, and pendulous swelling, which hung down over the cheek. Towards the outer canthus of the eye, the morbid texture was interposed between the conjunctiva and the sclerotica, to within the eighth of an inch from the cornea. It was chiefly in this direction that the disease was spreading. From the external angle of the eye the tumour was prolonged both outwards, and downwards. In the first direction, it extended to the point of junction of the temporal and malar bones; in the latter, it descended nearly half an inch below the line of the parotid duct. Through its whole extent, the tumour was free from pulsation; no large artery could be traced into it; by pressure it was

readily emptied of its contents ; but, on the removal of the pressure, it was again slowly filled. When emptied, by rubbing the collapsed sac between the fingers, a doughy impression was communicated to them. On the surface it was of a dark purple colour, with a tint of blue on those parts covered by the skin, but where invested by the conjunctiva, it had a shade of red. It was cold and flabby, communicating to the fingers the same sensation which is received on grasping the wattles of a turkey-cock.

As the tumour was increasing, and threatened to extend over the eye, the patient was anxious for its removal. Mr Burns began the operation by detaching the lower eyelid along its whole extent, he then dissected away that part of the tumour adhering to the sclerotica, and next removed that which adhered to the upper eyelid. This being done, he tied a pretty large artery which passed into the tumour from the outer and lower part of the orbit, by the temporal side of the inferior oblique muscle. The next stage of the operation consisted in dissecting off the tumour from the aponeurosis of the temporal muscle, the zygomatic process, the malar bone, and from over the branches of the portio dura, and the parotid duct. After the great body of the tumour was in this way removed, Mr Burns found that a part of the spongy morbid mass still remained attached to the parts behind the parotid duct and portio dura. He also discovered that some of the tumour dipt beneath the fascia of the temporal muscle, which was reticulated. From these parts there was a general oozing of blood ; and from the divided transverse facial artery, as well as from the arteries which perforated the malar bone and the masseter muscle, there was a pretty profuse bleeding. The vessels were secured, and then, with the forceps and scissors, Mr Burns cleared away the diseased matter from behind the parotid duct and portio dura, both of which were thus detached from all connexion with the neighbouring parts. In the same way, he was obliged to cut away a quantity of diseased substance from behind the zygoma. As the morbid parts were here ill defined, and much intermixed with the fibres of the temporal muscle, a considerable part of it required to be taken away, and in doing this, the deep-seated anterior temporal artery was divided. What of the tumour remained on the cheek, adhered so firmly to the zygomatic muscle, and was so closely incorporated with its substance, that the one could not be separated from the other. The insulated part of the portio dura and the parotid duct were now laid back on the masseter muscle, and the edges of the integuments brought into contact over them, and supported by means of a single suture. Over the malar bone the lips of the wound could not be made to approach, nor did the oozing from the bone cease. A fold of linen and a layer of sponge were therefore laid into this part of the wound, and retained there by a compress and bandage, applied so tightly, as to restrain the bleeding.

The sponge was removed two days afterwards, and an attempt made to bring the lips of the wound nearer to each other. The sore began to granulate, and threw out a flabby red fungus, the growth of which could not be checked by the application of sulphate of copper. By bringing the edges of the sore together, it was at length reduced to the size of a shilling, and was soon afterwards completely cicatrized.

Three years after the operation, the patient continued free from any return of the disease, and the cicatrice was becoming smaller. The only inconvenience which he experienced, arose from the motion of the upper eyelid being impaired, by its adhesion to that part of the sclerotica from which the tumour had been dissected. From the same cause, the eye did not possess the same latitude of motion as formerly. It required a considerable effort to turn the pupil towards the nose.[15]

It will be evident, upon the slightest consideration, how very different in activity, if not in nature, this case of Mr Burns is from that of Mr Bell, and how much less the danger attending the extirpation of such a passive or venous aneurism by anastomosis, compared to that which is inseparable from every attempt to touch with the knife, the active or arterial tumour of the same sort.

10. *Obliteration of the carotid artery.* The bold and successful

practice of Mr Travers, who, for an aneurism by anastomosis within the orbit, tied the common carotid artery, has been followed by Mr Wardrop in several cases of this disease situated externally. In these cases, Mr Wardrop went upon the probability, that if the current through a nævus were arrested by tying the arterial trunk supplying it, the blood contained in the cells, or parenchyma of the tumour, would undergo a process of coagulation, as the blood does in a common aneurismal sac after the artery has been tied, that the coagulated blood would be afterwards absorbed, and the parenchyma of the tumour gradually shrink. Mr Wardrop has published the particulars of three cases of nævus of the face, in which he tied the common carotid artery. All the three patients were young children. Two of them died, the circumstances previously to the operation being very unfavourable.

Case 125.—A female child, five months old, had a large subcutaneous nævus on the left side of the face, covering one half of the root of the nose, the eyebrow, and the upper eyelid. The eyelid could not be sufficiently raised to expose the eyeball, nor could the precise limits of the disease be traced in the orbit, within which it seemed to penetrate deeply. The tumour was of a pale blue colour, and there were numerous tortuous veins in the integuments covering it. It had no pulsation, felt doughy and inelastic, and when squeezed became greatly diminished; on removal of the pressure, its original size was rapidly restored.

As it would have been extremely dangerous, and probably even impracticable, to remove the tumour with the knife, and as it had been rapidly increasing since a few days after the birth of the child, Mr Wardrop concluded that the only chance of arresting the progress of the disease, was by tying the common carotid artery of that side on which the tumour was situated. The incision of the integuments was made about the middle of the neck, along the tracheal edge of the mastoid muscle, and the rest of the dissection was accomplished chiefly with a sharp-pointed double-edged silver knife. The operation was more difficult than might have been expected in a simple dissection amongst healthy parts, from the unceasing crying of the infant, which kept the larynx and trachea in constant motion upwards and downwards. This not only prevented the pulsation of the carotid from being distinguished, but when the sheath of the vessel was distinctly penetrated by the point of the knife, rendered it difficult to get the point of Bremner's aneurismal needle conducted by the finger fairly within the sheath. When, however, the latter step of the operation was accomplished, the needle passed around the artery with great facility. Some divided vessels bled a good deal during the operation, so that the wound was kept filled with blood, and the dissection was necessarily conducted with the finger as the only guide. The ligature being tied, the edges of the wound were brought together by a single stitch, and no adhesive plaister or bandage employed.

The infant appeared pale and much exhausted after the operation, and had a tea-spoonful of the syrup of white poppies. A remarkable change was immediately observed in the tumour. No sooner had the carotid been tied, than the child was observed to raise the upper eyelid sufficiently to expose the eyeball, which, until that period, had never been in view on account of the swoln state of the lid. The colour of the tumour also changed, losing its scarlet hue, and appearing of a much darker blue shade, a change, observes Mr Wardrop, which evidently had arisen from the collapse of the arteries, whilst the veins and cells of the tumour remained filled with venous blood. Soon after the operation, the child became tranquil, and in a few hours was permitted to suck, care having been taken, to keep the mother's mind easy by her absence during the operation, and by concealing from her the extent of the wound. The child passed a very quiet night, the operation seeming to produce very slight excitement in the general system. She continued to suck as if nothing had happened, and the wound inflamed so little as to require no dressing. The ligature came away upon the

11th day. On the day following the operation, the tumour continued of the same diminished bulk, and of the same dark purple colour, which it had assumed immediately after the artery was tied. On feeling the tumour, it seemed either as if the blood which it contained had coagulated, or that it was emptied of its blood; for pressure, instead of emptying its contents, now produced no sensible alteration. A gradual, though not always regularly progressive diminution followed; by degrees, more and more of the eyeball became exposed; and ten months after the operation, nothing of the tumour remained, more than the membranous bag which was originally distended with blood.[16]

Case 126.—A fat comely girl, 18 years old, was admitted as a patient into the Massachusetts General Hospital, 4th May 1829. Little more than a year before that time, she began to experience a strange feeling in the inner angle of the right eye, at the anastomosis of the facial, ophthalmic, and frontal arteries. This sensation she described as a crowding feeling in the eye. It soon extended to the head, and was accompanied with a pain so severe, that though otherwise in perfect health, she was obliged to give up her work as a house-servant, and had remained idle for some months before entering the hospital.

At this time, there was a tumour at the inner angle of the eye, just above the lacrymal sac, as large as a hazel nut. It had an active pulsation, which extended into the neighbouring arteries. The pulsations of the facial were very strong; and by compressing that artery, the vibrations of the tumour were much lessened. Compression of the temporal artery produced no change. The skin over the tumour was slightly reddened, and there was an increase of heat. The carotid artery had an augmented pulsation. Pressure on this artery suspended the pulse of the tumour. The stethoscope, applied over the carotid and facial arteries, gave the saw-mill sound.

After observing the case for a few days, Dr Warren performed the following operation. He made a small incision, between the tumour and the cavity of the orbit. The pulsation of the anastomosing branch of the ophthalmic was discovered, and a ligature passed round this branch. Next, an incision was made across the facial artery, below the tumour, and after allowing about 18 ounces of blood to flow, a compress was applied, including the artery and the tumour. On the division of the facial, the pulsation ceased, and the patient was relieved from her distressing feelings. On removing the compress, three days after, a slight pulsation was perceived. The wounds healed immediately, and the patient finding herself very comfortable, was discharged on the 1st June, although the pulsation had not wholly ceased.

Dr Warren was disposed to believe that the cutting off the supply from the ophthalmic and facial arteries would be followed by a disappearance of the tumour. His expectations were disappointed. In the latter part of October, the patient returned to the hospital. A very slight pulsation was discernible in the tumour, and the inner angle of the left eye had a pulsation somewhat stronger than that on the right side. The arteries leading into it, had strong pulsations. The carotid, on each side, especially on the right, throbbed violently; so that she sometimes said she felt as if the top of her head were flying off. The upper part of the face and the forehead were red and swoln; and, on the whole, there was a great aggravation of disease.

Dr Warren was at a loss how to proceed, as the disease now appeared equally on the left and on the right side, and extended apparently to the whole arterial system of each. He began by trying the effect of general remedies. The patient was ordered to be kept perfectly quiet; to live as low as possible; to have blood taken from the arm, and leeches applied frequently to the head; and to take the tincture of digitalis. These measures were followed by no favourable effect. Dr W. therefore laid bare and penetrated the temporal artery of the right side, allowed it to bleed freely, and then divided it; but the pulsations remained unmitigated. There seemed but one course left, that of tying both carotids, or rather, of tying one, and, if this did not answer, the other.

On the 2d January 1830, Dr W. tied the right carotid. The pulsations on the right side were immediately relieved. Those on the left continued for a time, then slowly subsided, and on the 3d March, the patient was discharged perfectly well.

Dr W. thinks that the complete success, from tying the right carotid, showed that the affection of the left side was altogether sympathetic.[17]

As the interruption of the current through the facial and ophthalmic arteries was not successful in checking the disease in the case just quoted, while it was ultimately cured by tying the carotid, it might perhaps seem advisable in similar cases to begin by securing the carotid, and not the immediate arteries of the tumour. Dr Warren states, however, that this is not the inference he should draw. He would not recommend the ligature of the carotid in such a case, in the first instance, because he should expect that vessels so small as those passing into the tumour, and communicating so freely with those of the other side, would be immediately supplied with blood from anastomosing arteries, to a sufficient degree to keep up the circulation, and maintain the morbid action in the tumour. He feels satisfied that tying the carotid at first would not have accomplished the cure in the above instance. The facial, temporal, and ophthalmic arteries had been previously divided, and the disease had felt the impression of this measure; the suspension of the current from the carotid, coming in aid of the means already employed, was sufficient to effect a cure. In support of these views, Dr W. refers to the case of a woman, who having fallen down stairs, and struck the inner angle of the right eye, a pulsating tumour arose there, which affected the vision of the eye. It extended into the orbit, so that he could not reach the ophthalmic branch within the tumour. He therefore tied the carotid, but without any alleviation of the disease. He would then have attempted the angular arteries; but the patient refused, and left the hospital. These views of Dr Warren are confirmed by a case of nævus situated on the vertex, in which both carotids were tied by Dr Mussey, with little permanent advantage, the disease afterwards requiring to be extirpated. This was done six weeks after tying the second artery, at the expense of a considerable share of hæmorrhagy; from the consequence of which, however, the patient eventually recovered.[18]

With regard to the various methods of treating nævus, it has been well observed by Mr Philips, that each has succeeded, and all have failed.

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[1] *Telangiectasia*, from τέλος *end*, ἀγγεῖον *vessel*, and ἔκτασις *extension*. *Tumeur Erectile* of the French. The disease here under consideration affects the capillaries, but there is an analogous state of the arterial trunks, sometimes called *aneurisma racemosum*. See Glasgow Medical Journal; Vol. i. p. 81; Glasgow, 1828. There is also a *varix racemosus*, for cases of which see Warren's Surgical Observations on Tumours, p. 427; Boston, 1837.

[2] Bell's Principles of Surgery; Vol. i. p. 456; Edinburgh, 1801. Bateman's Synopsis of Cutaneous Diseases, p. 329; London, 1819. Fawdington, in North of England Medical and Surgical Journal; Vol. i. p. 56; Manchester, 1830. Philips, in London Medical Gazette; Vol. xii. p. 7; London, 1833.

[3] Traité des Maladies Chirurgicales; Tome ii. p. 269; Paris, 1814.

[4] Surgical Observations on Injuries of the Head, and on Miscellaneous Subjects, p. 228; London, 1810.

[5] Medico-Chirurgical Review; Vol. vii. p. 280; London, 1827. Lancet; Vol.

xii. p. 760; London, 1827. Glasgow Medical Journal; Vol. i. p. 93; Glasgow, 1828.

[6] Zeitschrift für die Ophthalmologie; Vol. i. p. 485; Dresden, 1831.

[7] Lancet; Vol. xi. p. 652; London, 1827.

[8] London Medical Gazette; Vol. xix. p. 13; London, 1836.

[9] Ibid. Vol. xxi. p. 529; London, 1837.

[10] Surgical Observations on Tumours, by John C. Warren, M.D., p. 418; Boston, 1837.

[11] London Medical Gazette; Vol. vii. p. 677; London, 1831. Lancet, Nov. 1837, p. 353.

[12] North of England Medical and Surgical Journal; Vol. i. p. 66; Manchester, 1830. See Macilwain, in Medico-Chirurgical Transactions; Vol. xviii. p. 189; London, 1833.

[13] Archives Générales de Médecine; IIe Série, Tome viii. p. 5; Paris, 1835.

[14] Principles of Surgery; Vol. i. p. 461; Edinburgh, 1801.

[15] Observations on the Surgical Anatomy of the Head and Neck, p. 331; Glasgow, 1824.

[16] Lancet; Vol. xii. p. 267; London, 1827. Mr Wardrop's unsuccessful cases are contained in the Medico-Chirurgical Transactions, Vol. ix., and in the volume of the Lancet now quoted.

[17] Op. Cit. p. 400.

[18] London Medical Gazette; Vol. vi. p. 76; London, 1830.

SECTION XXI.—ŒDEMA OF THE EYELIDS.

The looseness of the cellular membrane of the eyelids, and the absence of adipose tissue, permit them readily, and to a great extent, to become œdematous. This affection may depend either on local or on general causes.

There is generally some œdema attending the acute stages of the ophthalmiæ. We see the lids become œdematous from wounds and bruises; from erysipelas; from diseases of the orbit, as necrosis; or diseases within that cavity, as orbital tumours; from the irritation of abscesses of the face or scalp; from the application of pressure to the lower parts of the face, as after the operation for harelip. When disease of the orbit, or within it, is the cause, the œdema often affects the opposite lids, as well as those of the same side; and the like is observed when abscesses about the head are the cause. After scarlatinous ophthalmia, and after the too frequent use of emollient fomentations and poultices, during inflammatory affections of the eyes, particularly where the poultices are allowed to become cold, and to lie long without being changed or removed, we not unfrequently find the lids become puffy and œdematous.

In other cases, œdema of the lids is part of a general dropsy, as in the anasarca consequent to scarlet fever; or it exists without any other part of the body being dropsical, in adults of leucophlegmatic constitution, or in scrofulous children. In some cases it appears to be a sympathetic affection, connected with disease in some remote organ. Thus, Dr Parry observed it in several instances, in connexion with violent pain of head, depending probably on costiveness.[1] It rarely happens that this affection occurs spontaneously,

or without some evident cause, in an individual otherwise perfectly healthy.

The eyelids affected with œdema are swoln, smooth, pale, semi-transparent, and soft; yielding easily to the pressure of the finger, and in some cases retaining the mark of pressure for a time. Their motions are impeded, and the eyes cannot be completely opened.

Œdema of the eyelids succeeding to a wound or bruise, to an attack of erysipelas, or to the pressure of a bandage on the lower parts of the face, is gradually and completely removed, when the cause which had produced it ceases to operate. That which appears in the morning in persons of a leucophlegmatic habit, diminishes during the course of the day, and is not dangerous. That which arises in scrofulous children, or in adults without any evident cause, continues long, or comes and goes at uncertain intervals of time.

Blood-letting in scarlatinous dropsy, and diuretics in other varieties of this disease, prove effectual in removing the attending œdema of the lids, in proportion as the urine becomes natural and copious.

It is only when this affection is part of a general anasarca, that it seems at all influenced by such remedies. In other cases, gentle stimulants externally, and tonics internally, may be used with advantage. Bathing the lids with rose-water, or with lime-water sharpened with a little brandy, will be found useful. Bags of dried aromatic herbs, as chamomile flowers, sage, or rosemary, with a little powdered camphor, suspended from the brow, so as to cover the lids, are highly recommended. The bags should be made of old linen, quilted, so as to keep the herbs equally spread out. When the œdema is periodic, and without any evident cause, a blister to the nape of the neck will be found advantageous. In scrofulous and debilitated subjects, chalybeates, and the preparations of cinchona, are indicated.

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[1] Collections from the unpublished Medical Writings of C. H. Parry, M. D.; Vol. i. p. 581; London, 1825.

SECTION XXII.—EMPHYSEMA OF THE EYELIDS.

A swelling of the eyelids, produced by the presence of air in their cellular membrane, may either be part of a general emphysema, arising from an injury of the organs of respiration, in which case the air, escaping from the lungs, spreads through the whole body, and accumulates chiefly where the cellular substance is loose; or it may be the consequence of such an injury of the nasal parietes, as shall permit the air to pass from the cavity of the nose, through the lacerated or fractured part, directly into the cellular membrane of the eyelids.

The following cases illustrate the second variety of emphysema of the eyelids.[1]

Case 127.—A young man received a violent blow on the nose, in consequence of which he experienced rather severe pain. Some hours after, while forcibly blowing his nose, he felt a peculiar sensation ascending along the side of it, to the internal angle of the left eye, and spreading to the two eyelids. These immediately became so much swoln, that the eye was entirely covered. When the patient was received at the Hôtel-Dieu, the lids were very tense and shining, but indolent and without any change of colour in the skin. An emphysematous crepitation was distinctly perceived.

He was bled from the arm, and compresses dipped in a discutient lotion were applied over the swelling. In four or five days the cure was complete. M. Dupuytren supposed that the blow received by the patient had occasioned laceration of the pituitary membrane, opposite the union of the lateral cartilage of the nose, which had been detached from the lower edge of the nasal bone.[2]

Case 128.—A lad, of 16 years of age, as he was going along the street, with a load, ran inadvertently against a person passing in the opposite direction; a scuffle ensued, in which he received a severe blow immediately over the right frontal sinus. About an hour after, having occasion to blow his nose, the eyelids and parts adjacent became immediately inflated, so as completely to close the eye; and he felt the air rush, he said, into those parts. On being admitted into Guy's Hospital, under the care of Mr Morgan, the eyelids were much distended, and so closely approximated, that they could not be separated by any voluntary effort of the patient; the eyebrow was also puffed up, and the cellular membrane between the ear and the orbit was in the same state of emphysema. The parts were not at all painful on pressure; they yielded a crackling sensation to the touch, and were free from discolouration. The supposed seat of the fracture was at a small distance above the superciliary ridge, where a slight depression, but no crepitus, could be felt. The globe of the eye was perfectly natural.

Two small incisions were made through the integuments, about the eighth of an inch behind the external angle of the frontal bone, which allowed the air to escape. The swelling subsided in 24 hours, leaving the eye and surrounding soft parts in a perfectly healthy condition.[3]

Case 129.—A robust man, 46 years of age, was brought in senseless into the Hôtel-Dieu, and placed in one of the surgical wards; but as there was profound stupor, with stertor, and complete relaxation of all the limbs, without any external lesion, he was removed into one of the medical wards. On examining him with care, the jaws were found strongly convulsed, and the muscles of the neck stiff. When the nose was pinched, so as to interrupt the passage of the air, respiration was suspended during at least half a minute, when a violent expiration being made, the left upper eyelid was perceived to swell a little, and the experiment being repeated, the same effect was again produced, and the eyelid assumed a considerable size, with emphysematous crepitation. On examining the eyelid, there appeared a slight abrasion, and yellowish tint of the skin, from which it seemed probable there was a fracture of the roof of the orbit, or of the base of the cranium, permitting the air from the ethmoid or sphenoid sinuses, to pass into the substance of the eyelid, when an obstacle was presented to its exit by the nose. Information was obtained, that he had been assaulted, about 12 days before, by several men, who hit him on the face with an umbrella, and left him lying senseless on the street. He died the second day after his admission.

On dissection, a fracture of the roof of the orbit, with laceration of the anterior lobe of the brain, extending to a depth of 8 lines, was discovered. The dura mater was separated from the bone to a great extent around the fracture, but was not torn. One of the osseous fragments extended to the great notch of the frontal bone, and communicated with the middle ethmoid cells, which contained a small quantity of liquid blood.[4]

The same plan of incision through the integuments, followed in the second of these cases, is also adopted when the eyelids are greatly distended, in cases of universal emphysema. It is merely, of course, a palliative remedy; the complete removal of the disease depending on the healing up of the injured part of the lungs, or

windpipe. Even in cases of fracture of some portion of the nasal parietes, the evacuation of the diffused air is merely palliative; and till the consolidation of the bone is effected, the emphysema will be liable to return.

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[1] A case of emphysema of the eyelid, from a gunshot wound of the frontal sinus, is related by Baudens, in his Clinique des Plaies d'Armes à Feu, p. 162; Paris, 1836.

[2] Leçons Orales de Clinique Chirurgicale, par Dupuytren; Tome i. p. 128; Paris, 1832.

[3] Lancet; Vol. x. p. 31; London, 1826.

[4] Menière sur quelques Cas rares d'Emphysême, Archives Générales de Médecine; Tome xix. p. 344; Paris, 1829.

SECTION XXIII.—TWITCHING, OR QUIVERING OF THE EYELIDS.

I have often been consulted by patients who complained of a tremulous, quivering, or twitching motion of one or other eyelid, or of both, which they were unable to control or to prevent, and which, from the frequency of its repetition, had become very annoying, although not attended with any pain. This, I believe, is the complaint called by the French *tic non-douloureux*. In many cases, the quivering of the orbicularis palpebrarum is so slight, as not to produce any visible motion of the affected lid; but in other cases, the motion is very evident, and is not confined to the lids, but extends to other muscles of the face, and especially to the zygomatici, so that while the eyelids are convulsed, the angle of the mouth is drawn upwards. Agitation of mind generally aggravates this affection of the face, so that in speaking to a stranger, it becomes much increased. The patient is conscious of this, his feelings are hurt by the knowledge of his being subject to the complaint, and he often becomes anxious to undergo any sort of treatment likely to relieve him, not even excepting an operation. Although in by far the greatest number of cases, no pain attends the disease, it is occasionally accompanied by pain so severe, as to resemble the tic douloureux. I have uniformly found the patient's digestive organs deranged, and generally from the use of alcoholic fluids.

The physiological discoveries of Sir Charles Bell regarding the offices of the fifth pair and portio dura of the seventh pair, lead us to refer such diseased motions of the face, as are above described, as well as all its healthy motions, both voluntary and involuntary, to the influence of the latter nerve.

The state of spasm or convulsion on one side of the face, sometimes produces an appearance as if the other side were affected with palsy. "A lady complained of pain in the head," says Sir B. C. Brodie, "and her mouth was drawn to one side; and hence she was supposed to suffer from paralysis of the muscles of one side of her

face. However, when I was consulted respecting her, I observed that there were nearly constant twitches of the cheek and eyelids on that side to which the mouth was drawn; and on more minute examination, I was satisfied that the distortion of the mouth arose, not from the muscles on one side of the face being paralytic, but from those on the opposite side being in a state of spasm. The case precisely resembled that of a patient with spasmodic wry-neck, except that the disease influenced a different set of muscles, namely, those supplied by the facial nerve."[1]

Treatment. 1. The patient must give up entirely the use of wine, ale, spirits, and the like.

2. Essential benefit results from the use of laxative, alterative, and tonic medicines. A blue pill every night, or every second night, and one or two compound rhubarb pills every morning, for a fortnight, will generally be attended with good effects; after which, a course of bitter infusion, precipitated carbonate of iron, or some of the preparations of cinchona, ought to be prescribed, along with country air and exercise.

3. Anodyne liniments, rubbed in along the course of the portio dura, have been recommended.

4. Pressure, so as to limit the motion of the parts spasmodically affected, has been found advantageous, tending to break the habit, on which, in a great measure, the complaint depends, by what means soever it may have been originally produced.

5. The abstraction of blood from behind the ear, by cupping or by leeches, is advisable. Turberville had a patient long troubled with pain and convulsions in his cheek; the place where the pain was could be covered with a penny; the convulsions pulled his mouth face, and eye aside. Turberville applied a cupping-glass to the place, then scarified, and cupped again: after which he put on a plaister, and the patient was perfectly cured.[2]

6. I have known an issue between the jaw and the mastoid process decidedly useful.

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[1] London Medical Gazette; Vol. v. p. 559; London, 1830.

[2] Philosophical Transactions; No. 164; Lowthorp's Abridgement, Vol. iii. part i. p. 34; London, 1716.

SECTION XXIV.—MORBID NICTITATION.

Natural nictitation is performed chiefly by the alternate relaxation and contraction of the levator palpebræ superioris, and is accomplished so instantaneously and easily as scarcely to attract the attention of ourselves or others; but there is a morbid nictitation, which appears to be in some measure a convulsive action of the orbicularis palpebrarum, too remarkable not to be observed by

others, and of which, at last, the patient himself becomes conscious. In the cases here referred to, the shutting of the eye, instead of being performed only once, is repeated several times in immediate succession. In some instances the upper eyelid is principally affected; and in other cases the lower. Sometimes one eye only; at other times both eyes are affected. Although different from the subject of last section, the present disease is aggravated by the same causes which aggravate the former, especially by agitation of mind, and disordered digestion.

Sometimes a single eyelash, growing inwards, so as to touch the eyeball, is the cause of morbid nictitation. In other instances, slight conjunctival ophthalmia produces it. These causes being removed, the complaint will cease. In all other cases, a treatment similar to what has been recommended for quivering of the eyelids, should be adopted. Advantage is obtained from the use of a collyrium, containing from 1 to 2 drachms of vinum belladonnæ in 8 ounces of water.

SECTION XXV.—BLEPHAROSPASMUS.

Some individuals are affected with such a degree of morbid nictitation that they cannot open their eyes for several seconds, during which period, the eyeball is strongly pressed by the contraction of the orbicularis; and yet the patient complains of no intolerance of light, nor can the temporary, but frequently repeated spasm be traced to any particular cause. Such cases of pure blepharospasmus are very rare.

Intolerance of light, or photophobia, and continued spasmodic contraction of the orbicularis palpebrarum, almost always go together, as effects produced by the same cause.

The common *external* causes of photophobia and blepharospasmus are, a particle of dust on the inside of the upper eyelid, an inverted eyelash, or scrofulous conjunctivitis. In the last instance, the spasm is often continued for weeks together, the patient being all that time unable to bear the least accession of light, or to open the eyes in the smallest degree. The inflammation during this state may be very inconsiderable, so that, on forcing open the lids, scarcely a red vessel is discovered. Such, however, is the sympathy between the conjunctiva, which is the immediate or primary seat of the disease, and the neighbouring parts, the retina, cerebral optic apparatus, lacrymal gland, and orbicularis palpebrarum, that the admitted light seems to the patient to blaze like the rays of the sun reflected from a mirror, the lacrymal gland instantly pours out a tide of burning tears, and the spasm of the orbicularis palpebrarum forces the lids together with new violence. The photophobia and spasm of the eyelids, depending on the causes now mentioned, generally subside

very soon after the foreign particle is removed, or the ophthalmia is subdued.

The most frequent *internal* cause of blepharospasmus, is morbid sensibility of the retina and cerebral optic apparatus, induced by overworking the eyes upon minute objects. In other cases, photophobia and blepharospasmus are sympathetic of disease in the bowels, the uterus, or some other organ; or arise from general disorder of the nervous system. Sometimes, spasm of the orbicularis of one side is brought on in consequence of a blow on the head, or other injury, the effects of which have been communicated to the brain or its membranes. The spasm continues long; for weeks, perhaps, or months; and is apt to be mistaken for palsy of the levator of the upper lid. A restless state of the edge of the upper lid, and the difficulty experienced in raising it even with the finger, will serve to distinguish this state from palsy.

Dr Schön relates[1] the case of a scrofulous girl, of 15 years of age, who laboured under blepharospasmus of the right eye for 15 months, not being once able during the whole of that time to separate the lids from one another. He employed all the remedies usually recommended, both internal and external, without the least effect. The left eye continued well, and the right never showed even a trace of inflammation. During the night of the 24th April 1831, the catamenia appeared for the first time, and the very next morning, the patient could open her eye with perfect freedom, and no longer saw double, as was previously the case when her lids were separated by another person.

Sir Charles Bell has recorded[2] an interesting case of photophobia and blepharospasmus, brought on by over-exertion of the eyes upon minute objects, in which the attacks came on periodically, the patient losing all control over the muscles of the eyelids and eyeballs. The complaint was attended with occasional pain extending round the head, as if it were bound with a hoop, and a whizzing noise in the ears. Suddenly the spasm would go off, the eyes becoming open, and capable of being fixed on the surrounding objects, for perhaps the space of an hour. Excitement of the mind in conversation would produce this temporary improvement; and what was very remarkable, the patient, an intelligent young lady, discovered that on pressing with the point of her finger on the little pit, before her ear and above the jugum, the eyes instantly opened, and remained so long as the pressure was continued. Sir Charles found, that when he put the point of his thumb under the angle of the jaw, and pressed the carotid against the vertebræ, the same effect was produced, proving, he thinks, that the cessation of the spasm was caused by some influence of the circulation over the nervous system of the head. On pressing down the cartilages over the left hypochondriac region, so as to affect the cardiac portion of the stomach, the eyes opened, and remained open while the pressure continued.

Treatment. The internal treatment of pure blepharospasmus will

consist in purgatives, tonics, and antispasmodics. Externally, counter-irritation is to be employed by means of friction with volatile liniment, tincture of cantharides, and the like, on the forehead and temple, and behind and before the ear. The application of blisters, and the insertion of issues, are requisite, when milder means are ineffectual. Exposing the eyes to the vapour of laudanum, by mixing it with hot water, and fomenting them with poppy decoction, or a warm infusion of extract of belladonna are useful. Poultices, containing opium, hyoscyamus, or conium, are also recommended to be applied over the eye. A small continued stream of cold water, or of water impregnated with carbonic acid gas, directed against the eye by means of a syringe or a syphon, is highly recommended by Dr Jüngken.[3] The patient, wearing a double green shade, should gradually accustom his eyes to the light, and not indulge, as is often done, in an increasing degree of obscurity. In cases where the spasm is traced to injury of the head, blood-letting from the arm, leeches to the head, and a course of mercury, will be required.

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[1] Ammon's Zeitschrift für die Ophthalmologie; Vol. ii. p. 153; Dresden, 1832.
[2] Nervous System of the Human Body; Appendix, p. xlvi.; London, 1830.
[3] Lehre von der Augenkrankheiten, p. 778; Berlin, 1832.

SECTION XXVI.—PALSY OF THE ORBICULARIS PALPEBRARUM AND MUSCLES OF THE EYEBROW.

In most cases of palsy of the face, there is a degree of lagophthalmos; or in other words, the eyelids cannot be completely closed, on account of the paralytic state of the orbicularis palpebrarum. The patient cannot wink hard, nor press the eyelids against the eyeball; neither can he, from the disease extending to the epicranius and corrugator supercilii, elevate his eyebrow, or frown, upon the palsied side. The tears run over on the cheek, from want of the action of the lower lid, which hangs depressed and everted; exposed to dust flying about, the patient is distressed by its getting into his eye; and thus inflammation of the conjunctiva, and opacity of the cornea may be excited.[1] The loss of power, however, in the orbicularis varies in degree. It but rarely happens that it exists to such an extent as to cause any material injury to the eye. In general, the lids merely do not close accurately, and we see the exposed eyeball turn up, when the ineffectual effort is made to bring the lids together. But in other cases, the lids are widely separated, and the patient can neither raise the lower, nor bring down the upper, by any voluntary effort. If we push down the upper lid with the finger, it is thrown into loose folds, and is immediately drawn up when we cease to press upon it; if we draw down the lower lid, and then let it go, it does not spring to the eye,

as in health. On the patient's falling asleep, the upper lid covers the pupil, the eyeball turning up and the levator palpebræ relaxing, but the lower lid remains depressed and everted. The retracted lids are generally puffy, and the eyeball seems protruded.

The other muscles of the face are generally paralyzed at the same time, and the natural motion of the lips is lost, so that the actions of whistling, laughing, &c. are impeded. While the sound side of the face is rotund and full, the palsied is soft and sunk. If the disease has continued long, there is a marked diminution in the thickness of the muscles. The cheek becomes so thin, that when the patient speaks, it flaps about as if it were only skin, and the corrugator supercilii and occipito-frontalis are so wasted, that the bones seem covered only by the integuments; the mouth is dragged from the palsied towards the sound side, and even the nose is twisted. Sensation over the face is natural, unless some cause be present which affects the fifth pair, as well as the portio dura of the seventh. From the exposed state of the eye, and the evaporation which goes on from its surface, the patient has a feeling of cold in it, which he remedies by covering it, perhaps, with his hand. At first, he is apt to sleep with the eye uncovered, when the air, drying it, will cause pain; but, by and by, he contrives to fall asleep with his fingers on his eyelids, or turns half over on his face, so that the pillow presses the eyelids together. Occasionally he complains of pain at the root of the ear, or in the neighbourhood of the stylo-mastoid foramen, from which the portio dura escapes, to send its branches over the face. Deafness is occasionally an attendant symptom. At the commencement of the disease, pain is sometimes felt, radiating along the branches of the nerve. In some cases, both sides of the face are palsied.[2]

Causes. Palsy of the face always depends on some affection of the portio dura; but it is of great importance to distinguish those cases in which the cause exists within the cavity of the cranium, from those in which the nerve suffers in its passage through the aqueduct of Fallopius, or after it has emerged from that canal, and is spreading itself to the facial muscles. Previously to the discoveries of Sir Charles Bell, palsy of the face was generally regarded as cerebral in its origin, and even when the seat of the disease was altogether exterior to the cavity of the cranium, the patient was treated with the severity which a serious disorder of the brain might properly demand.

Exposure to a current of cold air, is the most frequent cause of palsy of the face. This cause probably operates by producing inflammation of the portio dura, and, perhaps, in some cases, inflammatory swelling of the periosteum lining the aqueduct of Fallopius, and diminution of its caliber, so that the trunk of the nerve suffers pressure. The disease has been known to arise from the pressure of a lymphatic gland lying between the mastoid process and the angle of the jaw, and enlarged in consequence of inflammation of the mouth from the action of mercury. I have seen repeated instances in which palsy of the face attended carious abscess of the

tympanum, affecting, no doubt, the aqueduct of Fallopius. In a case which came under my observation, the disease followed a severe fall on the side of the head, which produced a discharge of blood from the auditory canal, and, it is probable, an extravasation of blood within the cavities of the temporal bone. Cutting across the portio dura, in any surgical operation about the angle of the jaw, will produce it. Mr Shaw mentions[3] a case, in which, during the removal of a tumour from before the ear, the moment the branches of the portio dura were cut, the patient cried out, "Oh! I cannot shut my eye.' One or other of the temporo-facial branches of the nerve may in this way be divided, and consequently one or other lid only may be palsied.

Facial palsy may depend altogether on cerebral disease; on pressure of the nerve, for example, exercised by some morbid effusion or formation within the cavity of the cranium, between the origin of the portio dura, and its exit by the meatus auditorius internus. In such a case, other cerebral symptoms will be present, as feelings of fulness and pain in the head, giddiness, sleepiness, &c.

Occasionally it happens that palsy of the face, depending on an affection of the aqueduct of Fallopius, is present along with serious disease within the cranium; the latter, however, in nowise operating on the portio dura. In other cases, the disease of the temporal bone, which originally produced the palsy of the face, goes on to affect the dura mater and the brain, suppuration of these parts takes place, and death speedily follows. This is especially apt to happen in scrofulous children.[4]

Treatment. In ordinary cases, the treatment must be directed against neither the brain nor the eyelids, but against the portio dura and the Fallopian aqueduct. Antiphlogistic means of cure are to be adopted in the first instance, as leeches behind the ear and near the angle of the jaw, cupping on the back of the neck, and free purging. Calomel and opium, and the use of diaphoretics, may next be had recourse to. A continued action on the digestive system by Plummer's pill, does good. A caustic issue, or a semilunar blister below the ear, and stimulating liniments over the course of the nerves going to the paralyzed parts, will be found of advantage. A succession of small blisters, dusted over with strychnia, is likely to be useful. Should these means not prove effectual, a trial may be given to electricity or galvanism. Electro-puncture appears sometimes to have been successful.[5]

When caries of the tympanum, by affecting the portio dura, produces palsy of the face, a perpetual discharge should be kept up behind the ear. The diseased ear may be cautiously injected every second or third day with a weak solution of nitrate of silver. The membrana tympani is always partially, and often totally, destroyed in such cases; and the indiscriminate use of injections might excite inflammation, extending to the brain and its membranes. If the patient be a scrofulous child, residence at the sea-side, and a course of sulphate of quina, ought to be prescribed.

Cerebral disease, producing palsy of the face, must be combated chiefly by means of depletion, abstinence, and counter-irritation.

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[1] See Shaw, in Medico-Chirurgical Transactions; Vol. xii. p. 117; London, 1823.

[2] See a case by Magnus, in Müller's Archiv für Anatomie, 1837, p. 258.

[3] Op. Cit. p. 138.

[4] See a case in an adult, in Pilcher's Treatise on the Structure, Economy, and Diseases of the Ear; p. 165; London, 1838.

[5] See a Case by Montault, in Medical and Physical Journal; Vol. lxiii. p. 463; London, 1830.

SECTION XXVII.—PTOSIS,[1] OR FALLING DOWN OF THE UPPER EYELID.

Inability to raise the upper eyelid may depend on a variety of causes; as, a redundant state of the integuments, injury, weakness, or palsy of the levator.

§ 1. *Ptosis from hypertrophy.*

After inflammation of the upper eyelid, attended with considerable œdematous or sanguineous effusion into its substance, or treated by the long-continued use of cataplasms, we sometimes find the lid so much thickened, and its integuments so much relaxed, that they form a fold, hanging down over the opening of the lids, while the levator palpebræ superioris is unable, from the weight and bulk of the lid, to raise it so as to uncover the eye. We perceive distinctly the endeavours of the muscle, as soon as the patient is earnestly desirous of opening his eye, but the eyelid is either raised only to a very inconsiderable degree, or remains completely depressed. If we take hold, between the finger and thumb, of a transverse fold of the skin, so as to relieve the levator muscle of the additional weight of integuments, the patient can, without difficulty, open his eye; but as soon as we quit our hold, the eyelid sinks to its former position. Sometimes the relaxation does not occupy so much the middle of the eyelid as its temporal portion. It is also occasionally the case, that when the fold of integuments is very considerable, it presses, by its weight, the edge of the lid, along with the cilia, inwards, so as to produce a degree of entropium.

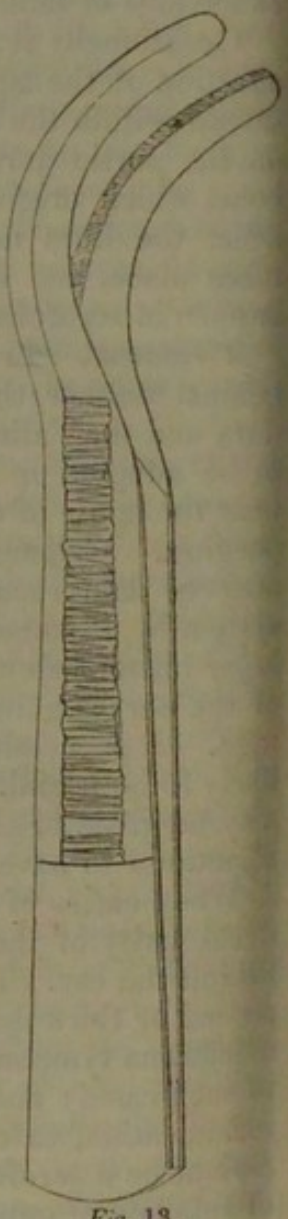

Fig. 13.

For the cure of this variety of ptosis, the common practice is to remove a transverse fold

of the integuments. In order to perform this with the necessary exactness, we take hold of the skin, where it appears most relaxed, with a broad convex-edged pair of forceps, commonly called entropium forceps, (*Fig.* 13.) and then desire the patient repeatedly to open and shut the eye. If he be able to do this, it is a proof that the forceps includes neither too much nor too little of the skin. If he cannot lift the lid, we have taken hold of too little, and must apply the forceps again, so as to include a greater portion of the skin. If he can, indeed, lift the lid, but not completely shut it again, we must let go a little of the skin from the grasp of the instrument. It is important also to take care that we do not apply the blade of the forceps too close to the edge of the lid, for if this be done, too little space will be left for the application of stitches. As soon, then, as the forceps is properly applied, we squeeze its blades together with moderate firmness, that the integuments may not escape, and then remove the portion laid hold of, by a stroke or two of the scissors. The bleeding is inconsiderable, and ceases in a few minutes by the use of cold water. Seldom more than two stitches are necessary; one is frequently sufficient. Union is generally effected very quickly, without any suppuration, and scarcely leaves any perceptible scar. As soon as the union is complete, the prolapsus is cured.

§ 2. *Congenital Ptosis.*

I have repeatedly met with a degree of depression of the upper lid, so considerable as materially to impede the function of vision, and which had existed from birth. In some of those cases, the lid was the reverse of being swoln; it rather appeared atrophic, as if the levator muscle had either been originally deficient, or had wasted from disease.

Removing a transverse fold of the integuments was tried in several of the cases to which I refer, but generally with little or no advantage. Perhaps better success might attend the operation recommended by Mr Hunt, which I shall immediately have occasion to explain.

§ 3. *Traumatic Ptosis.*

In penetrating wounds of the upper lid (see page 115), the levator may be cut or torn across, or the branch which it derives from the third nerve may be divided. The consequence will be inability to uncover the eye. In such a case, I have known the power of raising the lid, to be restored, probably from the re-union of the muscular fibres which had been divided.

Merely abridging the skin of the lid can be of no use in such cases. A close attention, however, to the structure and healthy functions of the parts concerned, has led Mr Hunt, of Manchester, to a more rational mode of operation for traumatic ptosis. His method may also be useful when this disease arises from congenital deficiency, or from palsy of the levator.

The operation recommended by Mr Hunt, is performed by dis-

secting off a fold of integument from the eyelid, and the difference from the usual way of proceeding, consists in the greater extent of the portion removed. The upper incision is made immediately below the eyebrow, and stretches, each way, to a point opposite the commissures of the eyelids. In making the lower incision, no precise direction can be given. It should approach within a short distance of the tarsal margin, and should meet the upper incision at both extremities. The extent of the portion included between the two incisions must vary according to the greater or less degree of the relaxation of the skin, which is the same in no two individuals. When the intervening portion has been detached, the divided edges should be accurately united by at least three stitches, and the wound dressed in the usual manner. The effect produced, when adhesion is completed, is the attachment of the eyelid to that portion of the skin of the eyebrow upon which the occipito-frontalis acts. By means of that attachment we substitute the action of this muscle, in raising the eyelid, for that of the levator.

The deformity likely to be produced by the removal of so large a portion of skin, in such a conspicuous situation, or the likelihood of substituting a lagophthalmos for the ptosis, may perhaps be urged as reasons against this mode of operating. The following case Mr Hunt gives as an answer to both these objections:—

Case 130.—In removing a large and deeply-seated tumour from the left orbit of a patient of the Manchester Eye Institution, owing to the connexion of the levator palpebræ with the diseased mass, the muscle was so much injured, that, after the patient had perfectly recovered in every other respect, what then appeared an incurable ptosis remained. When the lid was raised with the finger, the eye was found to possess perfect vision. Anxious to remedy the evil, Mr Hunt, when all tumefaction of the integuments had disappeared, removed an elliptical fold of skin, in the usual way. The wound healed well, but although a considerable portion had been included between the incisions, the effect upon the lid was hardly perceptible.

The poor man, after waiting for some weeks, was very solicitous to have another portion removed; and it was more in compliance with his desire than from any expectation of farther benefit, that Mr Hunt at length consented to repeat the operation. Whilst deliberating on the portion to be removed, it struck him that if it were sufficiently near the eyebrow, the action of the occipito-frontalis, which affects this portion of the skin, might also be available for raising the eyelid, and fortunately the result fully justified the conjecture. The operation was performed as is described above, the wound united by the first intention, and the patient could raise his eyelid to the same extent as that of the other side. No deformity was produced, and the eye could be as perfectly closed as before the occurrence of the disease.[2]

§ 4. *Atonic Ptosis.*

In some instances, we meet with a depressed state of one or both upper eyelids dependent apparently on mere weakness of the levator muscle.

In this case, mechanical support by means of a strip of adhesive plaister, assists in restoring to the muscle its wonted power. Applications of a strengthening kind are to be made to the lids; sponging them, from time to time, with rose-water, a solution of alum, brandy, or the spirit of nitrous ether; rubbing them gently

with tinctura saponis, and the like. Electricity may be tried, and general tonics.

§ 5. *Paralytic Ptosis.*

Palsy of the levator of the upper eyelid is an affection by no means uncommon. In some cases it bears an analogy, in point of cause, to the most frequent instances of palsy of the face, or, in other words, it arises from cold. In other cases, the cause is cerebral; it is perhaps arterial or venous congestion, sanguineous or serous effusion, or some tumour, formed within the cranium, and pressing on the third pair of nerves. It is often difficult, especially in the incipient stage, to distinguish these two sets of cases.

In both, we generally find that, along with the depression of the upper eyelid, either all the muscles of the eyeball are paralyzed, so that the eye stands stockstill in the orbit, or that, from the abductor retaining its power, the eye is turned towards the temple, while from the palsied state of the other recti, the patient is unable to move his eye upwards, downwards, or inwards. In the cases which are regarded as rheumatic, but which are probably as often apoplectic, one eye only is generally affected, and the abductor retains its power. In cases more decidedly cerebral, both eyes are apt to be affected from the beginning, although sometimes one side is first paralyzed, and then the other.

In paralytic ptosis, the orbicularis palpebrarum, preserving its power, keeps the eyelids constantly closed, so that the patient sees none, unless he raises the lid with his finger. When he does so, he generally sees double, and if he tries to walk across the room, he is affected with a great degree of vertigo. The double-vision and vertigo are owing to the axis of the palsied eye no longer corresponding to that of the sound one, and cease as soon as the eyelid is allowed to drop.

The rheumatic variety of this palsy is brought on by exposure to currents of cold air, and the like. I saw it induced, on both sides, in a man who walked about all day, with his hat wet, from having dropped it into a river. The cerebral variety is either sudden, or slow; the sudden, arising after fatiguing exertion, exposure to the direct rays of the sun, intoxication, blows on the head,[3] and the like; the slow, keeping pace with the growth of scrofulous tumours, fungous excrescences from the dura mater, and other organic changes about the basis of the brain.

The vision of the eye which lies behind the palsied lid, may or may not be affected. Often in the commencement of the rheumatic variety, we find the pupil dilated; and this dilatation of the pupil is accompanied with the usual obscurity of vision met with in mydriasis. Generally it happens in the cerebral cases, that vision becomes gradually affected, but sometimes it is suddenly so from the first.

Treatment. When palsy of the upper eyelid appears to arise either from cold, or from some sudden cerebral affection, we employ general and local blood-letting, rest, the antiphlogistic regimen, and

blistering of the head. After the use of these means, we generally find that the vertigo and other symptoms begin to yield. In both cases, we employ mercury till the mouth is affected, combining it in rheumatic palsy with opium, that it may act as a sudorific; in cerebral cases expecting it to prove useful as a sorbefacient. Sudorifics, as guaiac, and stimulants, as camphor, have been highly recommended in the rheumatic cases. In the cerebral cases, low diet, and the use of iodine are indicated.

Rubbing the palsied lid, the forehead and the temple, with the aromatic spirit of ammonia; issues in the neck, and behind the angle of the jaw; blisters to the brow, the raw surface being afterwards dusted with strychnia; and the use of electricity or galvanism are attended with advantage.

In slow cerebral cases, I have seen almost every sort of practice tried without effect.

In a patient of the Glasgow Eye Infirmary, in whom the disease attacked first one upper eyelid, and then affected both, with a paralytic debility present also in one side of the body, the internal use of arsenic appeared beneficial. To enable this patient to attend a little to her household affairs, we were obliged to keep the eyes alternately open by a bit of adhesive plaister, attached to the lid and fixed by its other extremity to the brow. A neater contrivance for elevating one of the upper eyelids, in double ptosis, would be a bit of silver wire, bent into a concave form, and fixed to the frame of a pair of spectacles.

Even in favourable cases, the power of the levator returns, in general, very slowly. We perceive, first of all, that the lid does not hang so flaccid, or so totally motionless, but that as the patient exercises his volition in respect to it, it is affected with a tremulous oscillation, and at length is raised a little from contact with the lower lid. Day after day, the degree of elevation is augmented, the iris comes into view, and by and by a part of the pupil, so that, the sound eye being closed, the patient begins to discern the objects placed before him. Half the pupil is at length uncovered, and slowly more and more of the eyeball can be exposed, till the motion becomes as extensive and as rapid as in health.

Mr Hunt's operation may be tried in paralytic cases, when no signs of improvement appear. The epicranius is active, depending on the nervous stimulus of the facial nerve, and the plan of bringing the lid under its influence deserves a trial.

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[1] Πτῶσις, from *πίπτω*, *fall*.

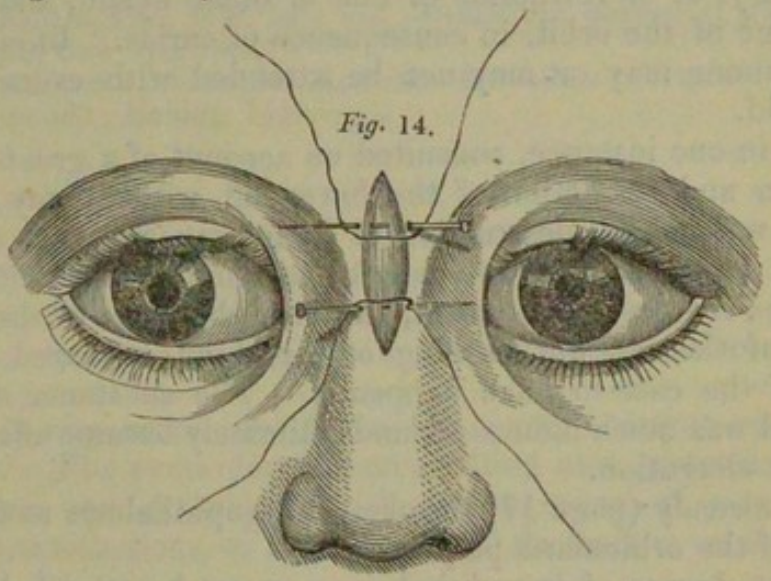
[2] North of England Medical and Surgical Journal; Vol. i. p. 166; Manchester, 1830.

[3] See a case of Amaurosis and Paralytic Ptosis, with seizures of a mingled epileptic and paralytic character, in Bright's Reports of Medical Cases; Vol. ii. p. 533; London, 1831.

SECTION XXVIII.—EPICANTHUS.

This name is given by Dr Ammon[1] to a congenital fold of skin, projecting in such a way from the side of the root of the nose, over the inner angle of the eye, that the caruncula lacrymalis is concealed

Fig. 14.



from view. The free edge of the fold is somewhat crescentic, and its extremities are continued into the skin of the upper and lower eyelids. This conformation has been always found to exist on both sides at the same time, and, according to Dr Ammon, gives to the countenance somewhat the expression of that of a Calmuck. This congenital peculiarity of structure had been previously noticed by Dr Schön.[2]

If epicanthus has the effect of retarding the motions of the eyelids, or of causing strabismus, it may be removed by operation. This was done by Dr Ammon, by cutting out an elliptical piece of skin about an inch in length, from over the back of the root of the nose, on a level with the epicanthus, and then bringing together the edges of the wound, by the harelip suture. (*Fig.* 14.) The consequence of this operation was, that the folds entirely disappeared.

If the folds do not exist in any great extent, the rising of the nose, as the person advances in age, may perhaps have the effect of obliterating them.

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[1] Zeitschrift für die Ophthalmologie; Vol. i. p. 533; Dresden, 1831.

[2] Schön, Handbuch der Pathologischen Anatomie des menschlichen Auges, p. 59; Hamburg, 1828. Zeitschrift für die Opthalmologie; Vol. ii. p. 120; Dresden, 1832.

SECTION XXIX.—LAGOPHTHALMOS.

The term *lagophthalmos*[1] is employed to denote that state, in which one or other eyelid, or both, are shortened in their perpendicular

diameter, so that they cannot be completely closed. (*Fig.* 6 and 7; page 41.) The consequence is that even during sleep, a part of the surface of the eyeball remains exposed to the action of the air, and the irritation of foreign particles. This state is generally the result of the contraction attending the cicatrization of a burn or other injury, or of retraction of one or other eyelid, and adhesion to the edge of the orbit, in consequence of caries. In either case, lagophthalmos may or may not be attended with eversion of the affected lid.

I was, in one instance, consulted on account of a great degree of depression and retraction of the lower lid, without any eversion. As there was neither destruction of its integuments, nor disease of the bone, I was inclined to suspect that suppuration between the eyeball and the floor of the orbit, had been the cause of the diseased position of the lid, but nothing of this kind appeared from the history of the case to have happened. The substance of the retracted lid was much indurated, and ultimately became affected with cancerous ulceration.

I have already (page 177) spoken of lagophthalmos as the result of palsy of the orbicularis palpebrarum.

A slight degree of lagophthalmos may not be attended by much inconvenience. When more considerable, inflammation of the conjunctiva and cornea, opacity of the cornea, and even staphyloma, may be the consequences. The exposed eye is incapable of the usual exertion, and is affected with epiphora and intolerance of light.

Treatment. Demosthenes and other ancient surgeons attempted to relieve the lagophthalmos which arises from a cicatrice, by making a crescentic incision through the contracted integuments, and endeavouring to keep the edges of the wound separate, as much as possible, by the interposition of dressings, till the cure was complete.[2] This plan was found to be ineffectual; as the cicatrice, resulting from the operation itself, necessarily gave rise to a new degree of contraction.

The lagophthalmos arising from caries of the orbit, is occasionally attended (*Fig.* 4, page 34) by a considerable transverse elongation of the edge of the eyelid, at the same time that it is drawn into an angle, and immovably fixed in its unnatural position. Under these circumstances, an operation similar to one or other of those practised for ectropium, may be performed with advantage; such as, detaching the lid completely from its unnatural adhesion to the orbit, loosening the neighbouring integuments from their attachments, and extending them towards the eyelid, cutting out a wedge-shaped portion of the whole thickness of the lid, and then bringing the edges of the wound together by stitches, so as to make the lid sit close on the eyeball, and by the transverse shortening thus produced, counteracting any tendency of the lid to be again drawn towards the edge of the orbit. Of course, nothing of this sort should be attempted till the bone is perfectly sound.

When, in consequence of the exposed state of the eye, the con-

junctiva becomes inflamed in cases of lagophthalmos, advantage will be derived from the use of the lunar caustic solution, and the employment of such mechanical means as may moderate the access of light and air.

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[1] Lagophthalmos, from λαγὸς *hare* and ὀφθαλμὸς *eye*, because it was believed hares slept with their eyes open.

[2] Aetii Contractæ ex Veteribus Medicinæ Tetrabiblos; Tetrabib. II. Sermo iii. cap. 73; p. 360; Basileæ, 1549.

SECTION XXX.—ECTROPIUM, OR EVERSION OF THE EYELIDS.

There is one *acute*, and there are several *chronic* varieties of ectropium. The acute depends on swelling and protrusion of the conjunctiva; the chronic arise in consequence of morbid contractions and adhesions, or total or partial destruction of the skin of the eyelids.

§ 1. *Eversion from Inflammation and Strangulation.*

This variety of eversion, sometimes styled *ectropium sarcomatosum*, takes place only when the conjunctiva is in a state of acute puro-mucous inflammation, such as in the Egyptian, or any other of the contagious ophthalmiæ.

When sarcomatous ectropium affects the upper lid, the protrusion of the conjunctiva is often enormous, and the surface of the membrane presents in an extraordinary degree that peculiar degeneration of the papillary structure[1] of the conjunctival corion, called *granular conjunctiva*. The mode in which this protrusion happens, has been well explained by Dr Vetch.[2] The inflammatory œdema of the eyelids, which for a time is excessive, beginning at length to subside, while no proportionate diminution of the swelling of the lining membrane of the lids has as yet taken place, the swoln and granulated conjunctiva loses that counterpoise which the external swelling afforded to it, and is forced outwards by the action of the orbicularis palpebrarum. If the protrusion is not immediately returned, the upper part of the eyelid and the retroverted cartilage act like a ligature on the parts protruded, and as the swelling increases, the stricture becomes still stronger by the natural but ineffectual efforts of the orbicularis to bring the tarsus into its proper position. The protruding tumour, therefore, is occasioned in a great measure by strangulation, like the swelling in paraphymosis.

When this eversion occurs in children affected with ophthalmia neonatorum, or some other severe puro-mucous ophthalmia, its origin is often in a great degree accidental. For example, the attendant, upon attempting to look at the eye or remove the copious

purulent discharge, unfortunately turns the upper eyelid inside out; the child begins to cry violently, this increases the eversion, and all attempts to reduce the lid to its natural position are found ineffectual. It is allowed to remain everted for some hours, or, as I have repeatedly seen it happen, for several days, and then the child is brought for advice. The everted lid is by this time greatly injected with blood; sometimes to such a degree, that pressure fails to overcome the eversion; or if we succeed in restoring the lid to its natural position, it very probably returns to the state of eversion, the moment that the child begins to cry.

When this variety of eversion affects the lower lid, there is nothing accidental in its production; it is entirely the result of the swelling and protrusion of the inflamed conjunctiva.

Treatment. We have recourse, in the first instance, to the application of leeches to the everted conjunctiva, or we scarify it with the lancet. After the tumefaction of the eyelid is somewhat reduced by the discharge of blood, we are in general able to return it to its natural position. For this purpose, we lay hold of it in such a manner, with the thumb and forefinger of each hand, as to express from it as much as possible of the thin fluid effused into its substance, and then suddenly bend its edge towards the eyeball, at the same time that we push back the protruded conjunctiva. If the state of inflammation is not very acute, we ought to maintain the lid in its natural position by means of a compress and roller. If the ophthalmia be still severe, we must content ourselves with recommending great care on the part of the attendants to avoid whatever might cause the child to cry, and instruct them in the manner of reducing the eversion, should it happen to return. From day to day, or more frequently than once a-day, if this is thought necessary, the eye is to be examined, and the proper means applied to the conjunctiva for removing the ophthalmia, as lunar caustic in different forms, sulphas cupri, red precipitate salve, and the like. Every other remedy, general or local, likely to promote the cure of the original disease, is at the same time to be persevered in.

I have seen repeated instances in which scarification failed, or if we succeeded by its means in lessening the degree of eversion, it speedily returned. In such cases, we must extirpate a portion of the diseased conjunctiva. By means of a ligature, or simply with a hook, or a pair of hooked forceps, we raise up the middle of the exposed and thickened portion of that membrane, and remove, with the scissors, a fold of it of the shape of a myrtle leaf. The wound bleeds profusely, and this assists in reducing the lid to a state favourable for replacement. Strips of plaister, passing from the upper to the lower lid, and a compress and bandage, are then applied, and are to be renewed from time to time till the cure is complete.

Prognosis. It is important to observe, that although our prognosis in every case of this variety of eversion may be favourable, so far as the eyelid is concerned, we must pronounce nothing regarding

the future vision of the patient, unless we are able distinctly to bring the cornea into view. In cases which have been neglected for a number of days, the swelling of the everted conjunctiva may be such, that we shall find it impossible to see the cornea, on our first examination of the eye; and under such circumstances we ought to forewarn the friends of the patient that we can promise nothing regarding sight. After the use of scarification and other means, we reduce the eversion and bring the cornea into view, but perhaps find the eye staphylomatous, and, of course, vision lost.

§ 2. *Eversion from Excoriation.*

The most common cause of eversion is excoriation of the lower eyelid and cheek, in consequence of long-continued catarrhal ophthalmia, or ophthalmia tarsi. In this variety of chronic eversion, we find the skin of the affected lid contracted, its tarsal edges rounded off, the Meibomian apertures partially or totally obliterated, the cilia destroyed, and a considerable portion of inflamed conjunctiva permanently exposed to view.

In children, this eversion is the result of neglected ophthalmia tarsi; in old persons, of chronic catarrhal ophthalmia. In the former, the misplaced state of the lid has generally been preceded by considerable superficial ulceration of the skin, the cicatrization consequent to which has shortened the lid, and dragged it downwards. In old persons, again, there is less appearance of cicatrization, while it would seem that the orbicularis palpebrarum has lost its power of supporting the lid, and that the tensor tarsi, being also weakened, allows the punctum lacrymale to fall forwards.

In the commencement of the disease, the exposed conjunctiva is swoln, presents a pale red colour, and possesses a natural degree of sensibility to the touch. Gradually, from the constant influence of the air upon a part not intended to be exposed to this excitement, and the occasional contact of external bodies, the conjunctiva of the everted lid assumes a redder and firmer appearance than natural, and at last becomes almost insensible to the contact of those substances which formerly excited pain or brought on bleeding.

The consequences of this disease are stillicidium lacrymarum, and occasional attacks of inflammation of the eyeball. Both these are the unavoidable effects of the interruption of the natural functions of the lower eyelid. In the state of eversion, it no longer covers completely and accurately the inferior part of the eyeball, which consequently remains exposed to innumerable causes of irritation, from which it ought to be guarded. In this state also, the tears are no longer guided onwards to the punctum lacrymale, nor is the punctum kept in contact with the eyeball, as in health, so that the tears are allowed to drop over on the cheek.

If nothing is done to remove the eversion, and the cause in which it has originated is allowed to continue, the lid becomes transversely elongated, so that, were it liberated from its unnatural situation and raised into contact with the eye, it would be found not to fit exactly,

being longer than sufficient to cover accurately the surface of the eyeball.

Eversion of the upper lid from excoriation rarely occurs, and never to any great extent.

Treatment. 1. By the use of the appropriate means, we endeavour to remove the remaining symptoms of the ophthalmia, which has given rise to the eversion.

2. The contracted state of the skin is to be relieved as much as possible, by frequently fomenting the lids with warm water, then drying them, and anointing them with oxide of zinc ointment. This softens the skin of the everted lid, renders it more pliable, and protects it from farther irritation.

3. Scarification of the exposed conjunctiva is highly useful, as well as the keeping of the lid raised to its natural position, by means of a compress and roller, carefully applied.

4. The application of escharotics to the internal surface of the lid is, in general, an effectual means of counteracting the tendency to misplacement in this variety of eversion. The sulphate of copper, or the nitrate of silver, solid, or in solution, will be found to answer well. Some surgeons[3] venture on the employment even of sulphuric acid for this purpose.

The upper lid is to be raised by the finger of an assistant, and the patient is to look upwards; then the surgeon, everting the conjunctiva of the lower lid as much as possible, and wiping it dry, passes the nitrate of silver pencil along its surface, which instantly becomes white; after which it is to be touched with a little water, by means of a camel hair brush.

If sulphuric acid is preferred, a bit of wood or the blunt end of a common silver probe is to be dipped in that fluid, and rubbed upon the conjunctiva of the lid, carefully avoiding the punctum lacrymale, caruncle, semilunar fold, and eyeball. The portion of conjunctiva touched by the acid immediately becomes white, and, in order to prevent the acid from affecting the eyeball, a stream of water should now be directed over the eyelid, by means of a small syringe. If the acid does not appear to have made the conjunctiva sufficiently white, the application may be repeated with the same precautions.

The application of the caustic, or of the sulphuric acid, should be repeated every fourth day. Neither of them causes a slough, but merely a general contraction of the part, and, after two or three applications, an evident diminution of the eversion. The escharotic applications must be continued from time to time, till the lid assumes its natural direction.

5. Should the means already indicated prove ineffectual, a portion of the relaxed and thickened conjunctiva must be extirpated. In order to execute this with exactness, it is necessary to calculate beforehand what amount of contraction of the conjunctiva would be sufficient to re-instate the eyelid in its natural position. If we remove too little, a degree of eversion will remain. If we remove too much, we produce a new disease, namely, inversion, which is at

least as bad as that which we have been endeavouring to relieve. The operation and after-treatment are the same as have already been mentioned under the first variety of eversion. If our calculation in the quantity to be removed has been correct, we find the ectropium cured as soon as the conjunctiva has healed.

6. In very bad cases of this sort we may, with advantage, have recourse to the removal of a wedge-shaped portion of the whole thickness of the lid, an operation we are frequently obliged to employ in the third variety of eversion.

7. Professor Dieffenbach has proposed an operation, the chief object of which is to restore the natural antagonism which ought to exist between the internal and external structures of the affected lid, but which is lost in this variety of ectropium. He removes no part of the conjunctiva or of the tarsus, but simply transplants these parts more towards the edge of the orbit, in such a way that if *a m b* (*Fig.* 15) represents the ciliary margin of the ectropium, and *a o b* the orbitary margin of the tarsus and conjunctiva, or rather the fold of the conjunctiva, (which, in ectropium of the lower lid, is higher than the ciliary margin,) by this transplantation of the conjunctiva and tarsus, *o* changes its place to *o'* and *m* to *m'*.

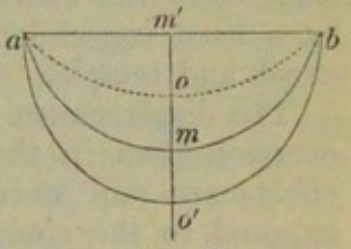

Fig. 15

Pincing up the integuments into a fold, they are to be divided by an incision, parallel to the lower edge of the orbit, and a few lines above it. This incision is to extend to two-thirds of the transverse breadth of the lid. The semilunar flap, formed by the incision, is to be dissected upwards, as far as the adherent edge of the tarsus, and there the lid is to be penetrated, and the conjunctiva divided to the extent of the external wound. By means of a hook, the conjunctiva, along with the tarsus, is now to be drawn into the external incision, and fixed there by the twisted suture.

A similar operation may be practised on the upper lid.[4]

§ 3. *Eversion from a Cicatrice.*

The cicatrice which operates in the production of this variety of eversion, is generally the consequence of a wound, an abscess, an ulcer, or a burn. In such cases, though nature contrives to produce, in place of the portion of skin which has been destroyed, a supplementary substance, yet matters are not restored exactly to their former state. The ulcer is covered, partly at the expense of the surrounding sound skin, which is drawn together and contracted over the sore, and partly by the formation of a new membrane, which, though we give it the name of skin, possesses but few of the properties of the old integuments. It is neither so large as the piece of skin which has been lost, nor is it so yielding, nor so elastic, nor so moveable upon the part which it covers. It is smooth and shining, and scarcely capable of distention, but above all, so far as the present subject is concerned, the surrounding original cutis is drawn

towards this supplementary production, is puckered and thrown into folds, and, to use the homely comparison of Mr Hunter, the whole appears as if a piece of skin had been sewed into a hole by much too large for it, and therefore it had been necessary to throw the surrounding old skin into folds, or gather the surrounding skin, in order to bring it into contact with the new.

A lacerated wound of either eyelid, allowed to heal without due attention, is very apt to end in eversion. The upper lid particularly we sometimes see completely everted, and peaked up into an angle, in consequence of a neglected or mismanaged laceration.

From severe burns, the eyelids are generally much puckered, contracted, and indurated; and not unfrequently both the upper and lower are affected with ectropium. The skin having been destroyed, from the margin of the eyelid to the eyebrow, or to the cheek, the lid is folded completely back, and adheres throughout its whole length to the edge of the orbit. It often happens, that the skin round the everted eyelids having also suffered, it is replaced by a hard unyielding cicatrice, stretching to the forehead, nose, cheek and temple.

The displacement being much greater in cases of this variety of eversion than in that which results from mere excoriation, the effects are still more annoying to the patient. The eye is more exposed to the contact of foreign substances, suffers oftener from inflammation, and is in a greater degree disfigured. The feeling of cold in the eye, from want of the covering naturally afforded by the lids, is often distressing.

The degree in which the everted lid is dragged from the eye is sometimes astonishing, and the consequent deformity actually hideous. For example, Cloquet notices[5] the case of a patient in the *Hôpital Saint-Louis*, who had eversion of each lower lid, in consequence of syphilitic ulcers of the face. The left lower lid was drawn down to the outer part of the upper lip. The tarsus had not been destroyed, but elongated; and formed, on a level with the lip, a slight, curved elevation of a whitish colour, from which proceeded the cilia.

Treatment. Such being the origin and effects of this variety of eversion, it comes to be a question how far it is curable, or in other words, whether there be any method of removing or counteracting the contraction arising from cicatrization.

This contraction, so far from diminishing of itself, gradually increases for some time after the process of cicatrization appears completed, in consequence of the absorption of the granulations, on which the new skin is formed. Matters then appear for a while to remain stationary, but in the course of years, the everted eyelid will have loosened itself a little from its unnatural situation, and not quite so much of the eyeball will be exposed. In consequence of the mechanical motion to which the parts are subjected, a slight increase takes place in the flexibility of the cicatrized surface, and it becomes somewhat less firmly attached to the subjacent textures. The parts,

which were at first matted immovably together, yield a little to the motions impressed on them by external causes, and the absorbents appear to contribute to this slight relaxation, by removing some of the adventitious substance which bound down the integuments. This is all the return which is ever made to the natural state by the action of the parts themselves.

The hand of art, however, has sought to relieve not only the present variety of eversion, but similar consequences of cicatrization in various parts of the body, by a more speedy and effectual method. Celsus gives[6] us an account of the operation, practised in his time, for the cure of this kind of eversion. It is the same operation as that employed by the ancients for lagophthalmos, and to which I have referred in the last section. When the disease was situated in the upper eyelid, an incision, down to the cartilage, was made, in the form of a crescent, the extremities of which were turned downwards. When the disease affected the lower lid, an incision of the same form was made there, the extremities still pointing downwards. The edges of these incisions were kept open as much as possible, by means of lint put into the wound, so that they healed up by a slow process of granulation and cicatrization. It was expected that the space between the edges would be filled up by new substance, that the eyelid would consequently be considerably elongated, and would return to its natural position, or in other words, that the eversion would be cured.

This operation has been frequently tried in later times, but so far from permanently curing eversion, it has often been found in the end to increase the very disease it was intended to relieve. Immediately after the incision, indeed, the eyelid can perhaps be brought nearly, if not altogether, into its natural situation; and so long as the process of granulation is going on, the case continues at least much better than it had been before. As soon as the wound is healed, however, it is found that the eversion has begun to return, and at the end of some months, matters are probably rather worse than they were before the operation.

1. *Extirpation of conjunctiva.* The following case, by Bordenave, sufficiently illustrates both the failure of the ancient operation, and the good effects of extirpating a portion of the conjunctiva, in this variety of eversion.

Case 131.—A man, aged 21 years, had eversion of the right lower eyelid, from a cicatrice, the consequence of a burn of the face, which happened in infancy. The eversion was considerable, the protruding part of the eyelid presented a redness disagreeable to look at, and the eye could not be covered by the lids. Bordenave found the cicatrice considerably flexible, and believed himself justified in hoping for a cure by the ordinary operation, which he performed some days afterwards, according to the prescribed rules.

Having made a semilunar incision of moderate depth, below the tarsus, he separated the lips of the wound with charpie, and kept them in this state by adhesive plaisters, compresses, and a suitable bandage. Some days afterwards, suppuration took place. The eyelid appeared extremely relaxed, it covered almost entirely the eye, and the cure seemed certain. But these appearances of success were not of long duration; the cicatrice being completed, and the eyelid no longer restrained, things returned to their former state. Not convinced, how-

ever, of the faultiness of the operation, Bordenave believed that he had not performed it with sufficient exactness; and therefore repeated it, but with no better success. He says, that he should now have despaired of curing the case, had not the patient's eagerness to be relieved, forced him in some manner to try a different treatment.

Seeing that he was unable to elongate the eyelid, in order to conceal the everted conjunctiva, he resolved to remove a portion of this membrane in almost all its length. This he did with a straight bistoury, and found the operation exceedingly beneficial. Some time after, the conjunctiva still protruding a little, he practised a second excision, which had all the success desired. In proportion as the conjunctiva cicatrized, the eyelid returned to its proper direction, it applied itself more immediately upon the eye; at last the eye closed much better, and the deformity became scarcely visible.[7]

In many cases, then, of eversion, arising from a cicatrice, the simple operation of removing the palpebral conjunctiva may be sufficient.

2. *Separation of unnatural adhesions, and extirpation of conjunctiva.* We meet with cases of eversion, caused by an external cicatrice, in which the dragging of the lid is too great, to permit us to hope that the counteraction of an internal cicatrice will of itself suffice to restore the part to its natural situation. Under such circumstances, it may be proper to dissect the everted lid from its morbid adhesions, and then to extirpate the conjunctiva. An incision being made through the cicatrice, or beyond it, and parallel to the everted cilia, the external surface of the lid is to be cautiously dissected from the parts to which it is bound down, so that it may be returned to its natural position. More or less of the conjunctiva, according to the degree of the eversion is then to be removed; after which compresses and a roller are to be applied, to keep the eyelid in the position to which it has been reduced, till the conjunctiva heals, and the external wound is cicatrized.

3. *Separation of unnatural adhesions, and perpendicular transposition of a quadrangular flap.* In cases of adhesion of the eyelid to the upper or lower edge of the orbit, Dr Ammon proposes the following operation. The integuments, to the distance of an inch from the place of adhesion, being put on the stretch, so that the morbid connexion of the eyelid to the orbit, is brought completely into view, let an incision be made parallel to the edge of the orbit, and about half an inch distant from it, somewhat more extensive than the morbid adhesion. From the ends of this incision, carry two other smaller incisions to the edge of the orbit. The flap, thus circumscribed, is now to be dissected from the subjacent parts, taking care not to cut through the thin, hard eyelid, where it adheres to the edge of the orbit, and avoiding the lacrymal ducts. The dissection being finished, and the wound cleared of blood, the eye is to be shut, and sutures applied, so that the eyelid may remain in the state of replacement and elongation to which it has been restored by the operation.[8]

4. *Perpendicular transposition of a triangular flap.* The following case illustrates a mode of operating, which Mr Wharton Jones has found successful in eversion and shortening of the upper eyelid, from contraction of the skin consequent to burns. The peculiarity

of the plan consists in the two following particulars. 1*st*, The eyelid is set free by incisions made in such a way, that when the eyelid is brought back into its natural position, the gap which is left may be filled up by approximating its edges, and thus obtaining immediate union. Unlike the Celsian operation, the narrower the cicatrice the more secure the result. 2*dly*, The flap of skin, embraced by the incisions, is not separated from the subjacent bone, but advantage being taken of the looseness of the cellular tissue between the skin and the bone, the flap is pressed downwards, and thus the eyelid is set free. The success of the operation depends on the looseness of the cellular tissue. For some days before the operation, therefore, the skin should be often moved up and down over the frontal bone, to render the cellular tissue more yielding.

Case 132.—A woman, aged 24, had her face much scarred. Both eyeballs were quite exposed on account of shortening and eversion of the upper eyelids. On the left side, the eversion of the upper eyelid was not so great as on the right. On this side, the ciliary margin of the tarsal cartilage corresponded to the edge of the orbit, and the opposite margin of the cartilage occupied the usual position of the tarsal margin, so that when an attempt was made to close the right eye, it was the orbital margin of the tarsal cartilage which was pressed down. There was some degree of shortening and eversion of the left lower eyelid. The patient saw very well with the right eye, but with the left, on account of some opacity of the cornea, she did not see well enough to recognise a person. At the age of one year and three months, she fell into the fire, and had her face severely burned, which was the cause of the state above mentioned.

Two years before coming under the care of Mr Wharton Jones, she had an operation performed on the left eye, and was improved by the operation. The eversion had probably only been lessened by the operation, for the shortening of the upper eyelid was still very great.

On the 22d February 1836, Mr J. operated on the left upper eyelid. He made two incisions through the skin, from over the angles of the eye upwards. The incisions converged towards each other, and met at a point somewhat more than an inch from the adherent ciliary margin of the eyelid. By pressing down the triangular flap thus made, and cutting all opposing bridles of cellular tissue, but without separating the flap from the subjacent parts, he was able to bring down the eyelid nearly into its natural situation by the mere stretching of the subjacent cellular tissue. A piece of the everted conjunctiva was snipped off. The edges of the gap, left by the drawing down of the flap, were now brought together by suture, and the eyelid was retained in its proper place by plaisters, compress, and bandage.

During the healing of the wound, a small piece of the apex of the flap, which had been too much separated from the subjacent parts, sloughed. By the 1st April, the parts were healed, and the eversion completely cured. The cicatrice, where the part sloughed, was pretty broad. When the bandages were first left off, the eyelid was so much elongated, that if the lower lid had not also been shortened, the eye would have been entirely covered. After leaving off the bandages, some shortening took place, not from contraction of the cicatrice, but of the skin. Being no longer on the stretch, the skin assumed, as it contracted, more of its natural appearance.

About the middle of March, Mr J. operated on the right upper eyelid. He made the incisions in a similar way, except that they did not meet in a point, a space being left between their extremities of about one sixth of an inch in length, which was divided by a transverse cut.

By the stretching of the subjacent cellular tissue, Mr J. succeeded in drawing down the flap, and thus elongated the eyelid so much as to cover the eye entirely, but in consequence of the long-continued displacement of the tarsal cartilage, the ciliary margin of it did not come into contact with the eyeball. He did not interfere with this state of parts, by attempting any transverse shortening of the

lid. In the operation, he removed a piece of the everted conjunctiva, and with it a bit of the tarsal cartilage. From the surface of this wound there sprung out a small soft fungus, which was cut off with the scissors, and the root touched with the lunar caustic pencil.[9]

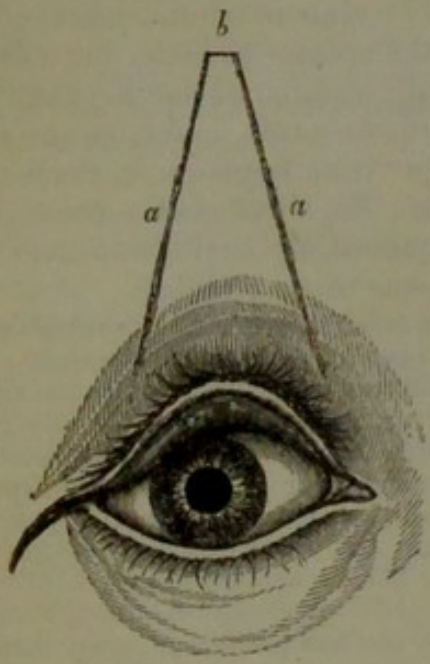

Fig. 16.

Fig. 16. *a a* Converging incisions. *b* Cross-cut uniting them. These three incisions enclose the flap, which is slid down by the yielding of the cellular tissue.

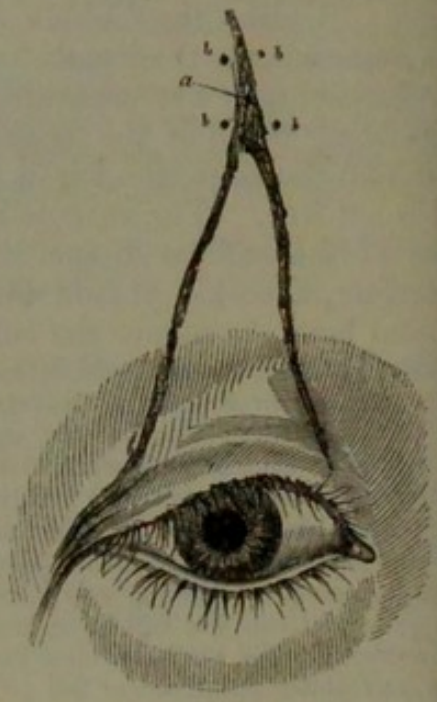

Fig. 17.

Fig. 17 shows the parts when healed. *a* The cicatrice where the gap was. *b b b b* The marks of the sutures.

5. *Separation of unnatural adhesions, extirpation of conjunctiva, and excision of a wedge-shaped portion of the eyelid.* When the edge of the everted eyelid is much elongated from canthus to canthus, the integuments of the lid destroyed, and its remaining substance firmly adherent to the bones forming the edge of the orbit, the following plan, first practised by Sir William Adams,[10] may be adopted with advantage.

In the *first* place, the everted eyelid is to be separated from its unnatural adhesion to the frontal, malar, or upper maxillary bone. This part of the operation is to be commenced with an incision of the integuments, parallel, but not quite close, to the edge of the everted eyelid, and is to be completed by repeated strokes of the scalpel. In the *second* place, the palpebral conjunctiva, especially if it be much thickened, is to be extirpated. In the *third* place, in order to counteract the morbid elongation of the eyelid from the outer to the inner canthus, a portion of the whole thickness of the eyelid, of the shape of the letter A, (*Fig.* 16.) is to be cut out with the scissors, after which, the edges of the last wound are to be brought together with a stitch or two. This makes the eyelid sit close upon the eyeball, as in health, and completely cures the eversion.

The wedge-shaped portion has generally been removed from the

middle of the lid, but as the scar which results, produces some degree of deformity, it is preferable to cut out the piece near the temporal extremity, as here the scar is less apparent, and produces less interruption of the motions of the part. The size of the piece to be removed, depends on the degree of the transverse elongation of the everted eyelid, and must therefore be left to the judgment of the operator. He must avoid cutting out too much, as, in this case, the parts will be so shortened, that the edges of the wound will not be brought into contact without stretching them so as to produce ulceration, thereby detaching the stitches before union is effected.

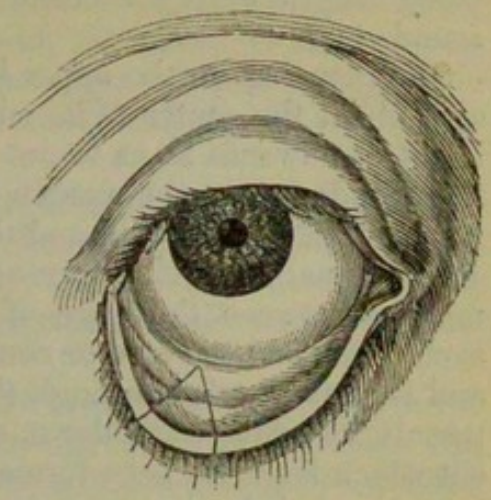

Fig. 18.

By the speedy union of the edges of the wound left by the excision of the wedge-shaped portion, the eyelid will be retained in its place, and the danger of the integuments re-adhering to the orbit be, in a great measure, prevented. To aid, however, in the cure, the eyelid should be covered with a spread pledget, and supported, against the eyeball, by a compress and roller. The opposite eye should be closed and covered, so that it may be kept at rest. The following case shows how the operation may be sometimes modified, and the eyelid supported in a different way, from that just mentioned.

Case 133.—In a case of eversion of the lower eyelid, Professor Gräfe first cut out a wedge-shaped portion of the eyelid, and united the edges of the wound by means of the harelip suture; but just before twisting the thread round the pins, he divided the skin of the cheek to the extent of $1\frac{1}{4}$ inch by an incision concentric with the edge of the orbit. He then twisted the threads, drew the ends of them upwards, and fixed them to the forehead by sticking plaister, so that the edge of the lower eyelid might be raised sufficiently. The incision through the skin of the cheek was thus made to gape, and in order to heal it with a broad scar, the edges were kept separate by a crescentic plate of lead, which was pressed in between the lips of the wound, and retained by strips of plaister. The wound of the eyelid was quite united on the third day, and that into which the plate of lead was inserted was cicatrized in the fourth week, the size and situation of the eyelid appearing natural.[11]

6. *Separation of unnatural adhesions, excision of a portion of the edge of eyelid, perpendicular and lateral extension of the eyelid and neighbouring integuments.* When the deformity is considerable, in cases of lagophthalmos or ectropium, produced by cicatrization, both the transverse and perpendicular diameter of the eyelid are faulty in their dimensions. The perpendicular diameter, or breadth of the eyelid, is shortened; the transverse diameter is elongated. An operation has been proposed by Professor Jäger of Vienna, the object of which is to increase the perpendicular length of the eyelid, as well as to reduce its transverse elongation.

Before proceeding to the operation, the difference in the length of the edge of the everted lid, and of the sound lid on the other side of the face, is to be accurately measured. In the operation, the trans-

verse length of the everted lid is to be reduced to that of the sound one.

In operating on the upper lid, the surgeon begins by taking hold of it about the centre of its edge, with a hook or forceps, and drawing it downwards so as to put on the stretch the cicatrice, by which the lid adheres to the margin of the orbit. A horn spatula may be inserted between the lid and the eyeball, so as to protect the latter. With a small scalpel, a transverse incision is now to be made, about midway between the edge of the everted lid and the superciliary arch. The incision is to be commenced and terminated in sound skin, and is to be carried through the whole thickness of the lid, so as to permit its edge to fall down, and the eyeball to appear through the slit which has thus been formed. The length to which the incision is to be carried must depend on the circumstances of the case.

The narrow slip separating the natural rima palpebralis from the artificial opening formed by the incision just described, is the part in which the reduction of the transverse diameter of the lid is to be made. The size of the portion which ought to be removed is already known from the measurements made before the operation was commenced. The portion removed will generally have a quadrilateral form. With forceps and scissors, this part of the operation is easily effected.

A straight double-edged scalpel is now to be used for separating any unnatural adhesions of the lid, and for detaching the integuments from the os frontis. Taking hold of the upper lip of the wound with the forceps, and separating it a little from the edge of the orbit, the scalpel is to be introduced upwards between the posterior surface of the orbicular muscle and the anterior surface of the frontal bone. The scalpel is now to be carried with a sawing motion towards the temple and external canthus, and then towards the middle line of the forehead, without enlarging the original wound of the lid, transfixing the skin, or injuring the periosteum. By this process, the skin and muscle covering the supra-orbital region and angles of the orbit are loosened from the subjacent parts, and rendered capable of undergoing a change in their position. The height to which the scalpel will require to be carried, and the extent in the transverse direction to which the integuments ought to be detached, must always be proportionate to the loss of the palpebral substance, and the different degrees of mobility of the skin of the forehead.

The wounds are now to be united by the interrupted suture. In the first place, the bridge or narrow slip of the lid, whence the quadrangular portion was removed, is to be united by two stitches. Then the integuments which have been loosened from the supra-orbital space and angles of the orbit, are to be pressed downwards by the assistant, over the eyeball, so that the edges of the transverse wound of the lid may be brought together. A stitch is to be inserted near the middle of the transverse wound, so as to act as a central point of traction upon the surrounding integuments. Should the upper lip of the wound not much exceed the lower lip in length,

lateral stitches may be immediately inserted; if, on the other hand, t exceed to the extent of forming a fold, this must be removed by he scalpel or scissors, in order that the edges of the wound may be nicely adjusted. The number of stitches required cannot *à priori* be determined.

Coaptation of the wound having thus been effected, the eyeball is covered by integuments obtained partly from the supra-orbital region, but chiefly from the angles of the orbit; the eyebrow, however, will be somewhat more depressed, and describe a smaller and less convex arch than formerly.

Professor Jäger's operation upon the lower eyelid consists in removing a wedge-shaped piece from its edge, and in detaching the integuments from the margin of the orbit and the cheek, by a similar process to that already described for increasing the perpendicular diameter of the upper lid.

The stitches are to be supported by interposing narrow strips of court plaister. The wounds are then to be covered with small pieces of lint, and graduated compresses are to be placed upon the supra-orbital region, or cheek, according as the operation has been performed for the restoration of the upper or lower lid. Over the graduated compresses long strips of adhesive plaister are to run, being applied in such a manner as to draw the integuments towards the lid, and approximate them to the bones. When the upper lid has been operated on, the adhesive plaister may extend from the nape of the neck to the cheek. A roller may be applied to assist the action of the plaisters, if it be deemed necessary. In the after-treatment, nothing ought to be omitted likely to effect union by the first intention.

Smart inflammation, requiring active treatment for its removal; nausea and vomiting, demanding the use of opium and effervescing draughts; premature removal, from accident, of one or more of the stitches; and ulceration of the edges of the wounds; are among the unfavourable occurrences which occasionally supervene to the operation.[12]

7. *Tarsoraphia.* It occasionally happens from an extensive burn, that both eyelids are everted, and dragged towards the temple. In such cases, besides dividing the cicatrice, removing part of the exposed conjunctiva, and perhaps cutting out a portion of the whole thickness of one or of both lids, it has been found useful to pare away a portion of the edges of the lids at their outer angle, and then to bring the two together by a stitch. This *tarsoraphia*, as it has been termed, reduces the opening between the lids to its natural length, and removes much of the deformity.

A somewhat similar practice was followed by Le Dran, in a case of eversion of the lower lid, at the inner angle of the eye. He removed the thickened conjunctiva, extirpated the cicatrice, and brought the edges of the wound together by two stitches.[13] Professor Walther has published[14] a case of traumatic eversion of the external angle of the lids, cured by the same plan.

8. *Transplantation of a portion of skin.* Professor Jüngken pro-

posed to extirpate the cicatrice, and then to enlarge the wound, so that by giving the lid sufficient length, it might be restored to its natural position. A piece of pasteboard was then to be taken, of the exact size and shape of the wound, and laid on the cheek, if the lower lid was the seat of the eversion; on the temple, if it were the upper lid. The piece of skin covered by the pasteboard, except a narrow slip, which was to be left undivided, was now to be insulated by an incision; it was to be dissected from the parts it covered, with as much cellular substance attached to it as possible; and then twisted round into the wound left by the extirpation of the cicatrice. The bleeding was to be stopped by the application of cold water, the clotted blood removed, and the edges of the supplementary piece of skin connected with those of the wound left from the extirpation of the cicatrice, by means of stitches, strips of plaister, and a bandage.

When there was reason to think that organic union had taken place between the piece of skin and the subjacent surface, the connecting slip was to be divided, and returned as much as possible to its original place. The stitches were to be removed at the proper time, and the parts secured by sticking plaister alone, till entire union and cicatrization were effected. The wound caused by the abstraction of the piece of skin was to be closed as completely as possible by sticking plaister, that it might heal with a small scar.[15]

Professor Jüngken twice adopted this method in cases of ectropium of the lower eyelid; but in both cases it failed entirely.[16] Some such method appears, however, to have succeeded in the hands of Dr Fricke of Hamburgh.[17]

Professor Dieffenbach has introduced another mode of forming a supplementary eyelid, which does not require the flap of skin to be twisted, but merely shifted from the temple. Less deformity is produced in this way, than by taking the flap from the forehead or the cheek. We cannot pretend to make a perfect eyelid by the transposition of a piece of skin, destitute of mucous lining, as well as of cilia, lacrymal apparatus, cartilage, and muscles; yet a new eyelid, even of mere skin, covers and protects the eye, lessens deformity, and frees the patient from suffering. In attempting to supply a new eyelid, we should save the conjunctiva as much as possible, cutting none of it away, but separating it, if necessary, from the diseased integuments. We ought to lay the flap of transposed skin on the conjunctiva, so that they may adhere together. We should save, with the same care, the border of the old eyelid, with its cilia, and unite it by sutures to the edge of the flap. The puncta and lacrymal canals ought also to be spared. As it is not likely that the new eyelid will possess any muscular motion, we must avoid making it either too large or too small.

In Dieffenbach's blepharoplastic operation, the cicatrice is first to be extirpated, and a triangular form given to the wound, the basis of the triangle being always turned towards the eye. In this part of the operation, the ciliary edge of the eyelid, if present, is to

be preserved; but if ulceration has destroyed the whole eyelid, except the conjunctiva, this membrane is to be detached from the parts to which it adheres, in the course of a line drawn from the inner to the outer angle of the eye, and laid out upon the eyeball. The triangular space being thus prepared, into which the flap of skin is to be transplanted, an incision is to be made from the temporal extremity of the basis of the triangle, in the direction of the meatus auditorius externus, whether it be the upper or the lower lid which is to be supplied. This incision of the skin should be considerably longer than the basis of the triangular wound. From the temporal extremity of this incision, another is now to be carried upwards, if it is the upper lid which is to be supplied, downwards, if it is the lower, and in either case parallel to the temporal edge of the triangular wound. These incisions are the boundaries of the flap, which, being transposed, is to form the new eyelid. The flap is now to be dissected from the subjacent parts. The bleeding having ceased, and the internal surface of the flap being freed from coagulated blood, the flap is to be drawn from without inwards, so that its inner edge is brought into contact with the inner edge of the triangular wound. These two edges are first of all to be steadied by a stitch at the inner canthus; then, the tarsal edge of the flap and the conjunctiva are to be brought together by fine silk stitches; and lastly, the inner edge of the flap is to be connected by Dieffenbach's suture[18] to the internal edge of the triangular wound. The temporal edge of the flap is not connected by sutures. The triangular space left by the transposition of the flap, is covered with lint and adhesive plaisters, so applied that they serve also to support the new eyelid in its place. Should suppuration take place, in the course of the cure, beneath the transposed flap, the matter formed will escape from under its temporal edge.

Cold applications are recommended, as most likely to promote speedy adhesion, and prevent suppuration. The breadth of attachment between the transposed flap and the neighbouring integuments is much more likely to prevent gangrene, than if only a narrow twisted slip had formed the connexion.[19]

This method of forming a new eyelid has been successfully followed by Dieffenbach, Lisfranc, Ammon, Eckström, Blasius, and Fricke.[20]

A similar operation has been practised by Professor Dieffenbach for eversion, involving both eyelids and their external commissure. He extirpates the commissure, along with a triangular piece of the neighbouring integument, the basis of which is towards the eye, and the apex towards the ear. One curved incision is then carried, I presume from the apex of the triangular wound, above the supra-orbitary arch, and another beneath the lower orbitary margin, towards the nose, each incision measuring about an inch and half in length. The two crescentic flaps thus formed, are then raised, and after bringing them over the triangular wound, they are adapted as new lids to the remaining conjunctiva.[21]

Case 134.—Mrs S. had the misfortune to have her face sadly disfigured by syphilis. She lost her nose; her upper lip was so much shortened, that she could not cover the teeth of the upper jaw; the left upper eyelid was destroyed, and the lower in a state of complete ectropium. Several extensive cicatrices on the hairy scalp and forehead showed the previous existence of necrosis, with exfoliations of the outer table of the skull. A considerable portion of the upper, outer, and lower edge of the orbit had been lost in this way. The greater part of the left upper eyelid was so completely removed by ulceration, that its remains surrounded merely, without covering, the eyeball. The conjunctiva of the small portion which remained was turned outwards, and its tarsal edge very irregular.

Dr Ammon began his operation by insulating and separating from the temple the flap of skin, (*b, c, d, e, Fig.* 19.) by which the defective upper eyelid was to be supplied; he then divided all the adhesions of the old eyelid, and prepared the place (*a, b, c,*) for the reception of the new one. He formed the flap by a horizontal incision (*c, d,*) two inches and a half in length, to which he joined the perpendicular one, (*d, e,*) and then dissected it off. He reduced the shrunken remains of the old eyelid with the bistoury; but unfortunately found it impossible to separate enough of conjunctiva from it, to form a lining membrane for the new eyelid.

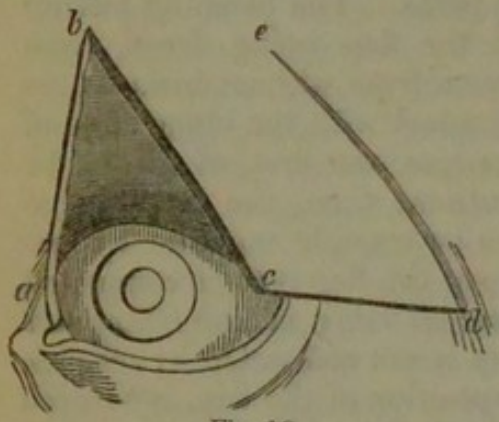

Fig. 19.

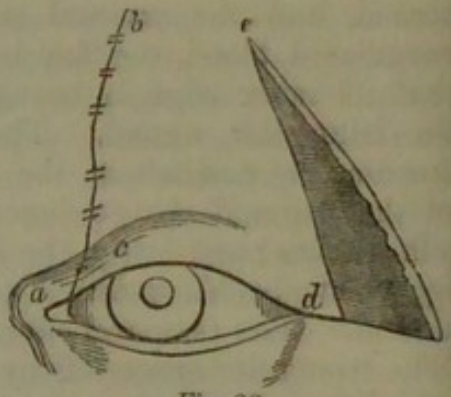

Fig. 20.

As soon as the bleeding had ceased, the flap forming the new eyelid having been brought into such a position that it covered the eye, it was secured along its inner edge (*b, c, Fig.* 20.) by Dieffenbach's suture; and thus ended the formation of the upper eyelid.

To remedy the ectropium of the lower eyelid, Dr Ammon first of all carried an incision through the skin, parallel to the edge of the lid, and then dissected it from its unnatural adhesions; he next extirpated a horizontal fold of the exuberant conjunctiva; and, lastly, having made a cut, like a button-hole, through the lid, about 4 lines from its edge, by means of a ligature he laid hold of that part of the conjunctiva which still remained attached to the tarsal portion of the lid, drew out the ligature through this wound, and so fixed the lid in its natural position.

At the temporal angle, the upper and lower eyelids were now connected by the twisted suture, which, after some hours, was removed, Dr Ammon fearing that thereby the fissura palpebrarum might be made too small. The wound on the temple, caused by the transplantation of the new eyelid, was covered with charpie, and a thick compress wet with water.

Next day, the transplanted skin was somewhat swoln, so much so, that the fissura palpebrarum was no longer visible, and the eyeball was entirely concealed. By injecting tepid water, Dr Ammon removed the matter which collected on the eye; but, notwithstanding this precaution, a considerable œdema of the conjunctiva took place. Union of the inner edge of the transplanted flap was not entirely effected by the first intention, so that, as the stitches were gradually withdrawn, strips of sticking plaister were applied. The wound on the temple granulated favourably. The cut through the lower eyelid, into which the conjunctiva had been drawn, closed perfectly; so that the eyelid, after the œdema had subsided, maintained its proper position.

The granulation of the wound on the temple proceeded, and along with it the formation of the new outer canthus. Three weeks after the operation, the fissura palpebrarum appearing too small, Dr Ammon slit up the outer canthus as far as the edge of the orbit, and endeavoured to prevent re-union by the introduction of charpie between the lips of the wound. Notwithstanding this, he was obliged, two months afterwards, not only to slit up the outer canthus again, but to extirpate a stripe of skin, so as to give to the fissura palpebrarum the proper degree of length; in which he completely succeeded.

The transposed flap forming the upper eyelid, assumed more and more of a natural appearance. The middle of it, however, continued to be œdematous and of a bluish colour, till, on forming a new nose for Mrs S. out of her forehead, erysipelas came on and spread to the new eyelid; after which, the œdema became greatly less, and at last vanished entirely.

Seven months after its formation, the new eyelid closed over the eyeball, without irritating it; it could be lifted from it like a natural eyelid, but generally hung over it in a state of semi-ptosis. The cicatrice on the temple was very small, so that it was difficult to believe that so considerable a portion of the integuments had been taken from that part.[22]

§ 4. *Eversion from Caries of the Orbit.*

I have already had occasion to refer (pages 34 and 41) to the great degree of shortening of the lid, with which eversion from caries of the orbit is generally attended, and to a circumstance which we may remark more or less in every variety of this disease, but which is often very strikingly displayed in those cases where the upper lid is dragged up under the edge of the orbit from an affection of the bone, namely, the degree of accommodation of the lower lid to the deficient state of the upper.

Cases such as those represented in *Figures* 3, 4, and 5, (page 34) may often be relieved by one or other of the operations recommended for the third variety of eversion, and particularly by those compound ones in which the morbid adhesions are separated, the eyelid and neighbouring integuments extended, the thickened conjunctiva removed, and a wedge-shaped portion of the eyelid cut out.

Dr Ammon, in a case of eversion, with adhesion of the cicatrice to the outer surface of the edge of the orbit, surrounded the deeply-depressed cicatrice by an incision, left it adherent to the bone, detached the neighbouring integuments all round to such an extent that the lid was set at liberty, and the patient could shut the eye, and then closed the external wound over the old cicatrice. The lid was in this way elongated, a scarcely observable scar ensued, and the disagreeable depression at the edge of the orbit was no longer in view.[23]

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[1] Soemmerring, Abbildungen des menschlichen Auges; Tab. ii. Fig. 14; Frankfurt am Main, 1801. Eble über den Bau und die Krankheiten der Bindehaut des Auges; Wein, 1828.

[2] Practical Treatise on the Diseases of the Eye, p. 228; London, 1820.

[3] See Guthrie's Lectures on the Operative Surgery of the Eye, p. 61; London, 1823.

[4] Staub de Blepharoplastice; p. 79; Berolini, 1835.

[5] Pathologie Chirurgicale, p. 136.; Pl. x. Fig. 17; Paris, 1831.

[6] De Re Medica, Lib. VII. Pars ii. Cap. i. Sect. 2.

[7] Mémoires de l'Académie Royale de Chirurgie; Tome xiii. p. 170; 12mo;

Paris, 1774. Mr Guthrie has fallen into an error, when he says that Bordenave's memoir is written to prove the necessity of removing both the cicatrice and the internal fold or swelling of the conjunctiva, in order to effect a permanent cure. Bordenave's object is to prove that the removal of the cicatrice, if not actually injurious, is followed by no good result, but that cutting out a fold of the conjunctiva is of itself sufficient to cure the eversion. Bordenave disapproves of Saint-Yves' use of lapis infernalis for destroying the everted conjunctiva.

[8] Zeitschrift für die Ophthalmologie; Vol. i. p. 47; Dresden, 1830.

[9] London Medical Gazette; Vol. xviii.; p. 224; London, 1836.

[10] Practical Observations on Ectropium, &c; London, 1814. To Sir William Adams undoubtedly belongs the merit of the operation described in the text. The reader, however, who has at all turned his attention to the history of this part of surgery, will at once trace the resemblance of Sir William Adams' operation to that practised by Antyllus, some 14 or 15 centuries before. Aetius gives us the following account of the method of operating practised by Antyllus. 'Should the eversion be greater, the surgical operation is to be performed thus: 'Let two incisions be made on the internal part of the eyelid, having the form 'of the Greek letter Λ, so that, the narrow part of the letter be turned towards 'the cheek, and the broad part towards the margin of the eyelid. Then the 'strip resembling the figure of the letter Λ is to be cut out, the flesh lying 'under it being excised at the same time. For the lower eyelid is not cartil-'aginous. The skin is to be left undivided. The lips of the wound are then 'to be drawn together by a suture; for one suture made near the margin of the 'eyelid will suffice. The eyelid thus bent and elevated will return inwards. 'But should a cicatrice, formed outside the eyelid from any cause, have everted 'the eyelid, these must first of all be removed, as has been described, the strip 'bearing the form of the letter Λ, without making a deep wound, and the lips 'of the incision, as has been said, must be brought together by a suture. After-'wards, the cicatrice being drawn outwards by means of a hook, we pass a 'needle, having a double thread, under the fleshy mass of the whole cicatrice, 'entering the needle from the little angle, and bringing it out towards the great 'angle of the eye. The needle being thus placed, we put the thread under both 'ends of it, and by this means we draw out the whole fleshy mass of the cicatrice, 'and thus make the excision of it, removing along with the fleshy mass the 'needle which is fixed in it. After the operation, we open up the external wound 'with pieces of lint.' Aetii Contractæ ex Veteribus Medicinæ Tetrabiblos; Tetrabib. II. Sermo iii. cap. 72. p. 359. Basileæ, 1549.

[11] Bericht über das clinische chirurgisch-augenärztliche Institut der Universität zu Berlin, für 1829 und 1830, p. 9; Berlin, 1831.

[12] Dreyer, Nova Blepharoplastices Methodus; p. 40; Vindobonæ, 1831. Brown, in London Medical Gazette, Vol. xvii. p. 721; and Vol. xviii. p. 485.

[13] Mémoires de l'Académie Royale de Chirurgie; Tome ii. p. 343. 12mo; Paris, 1780.

[14] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. ix. p. 86; Berlin, 1826.

[15] Lehre von den Augenoperationem, p. 267; Berlin, 1829.

[16] Ibid, p. ix.

[17] Blepharoplastik oder Bildung neuer Augenlider; Hamburg, 1829; a work which I have not had an opportunity of consulting. Delpech has published an interesting case of restoration of part of the lower eyelid, and side of the nose, by a Tagliacotian operation, in his Chirurgie Clinique de Montpellier; Tome ii. pp. 221, 253; Paris, 1828.

[18] Dieffenbach's suture is a twisted one, formed by passing slender pins, such as are used for impaling insects, through the edges of the wound, then twisting round the threads, and lastly cutting off the pins close to the threads.

[19] Dr Zeis's description of Professor Dieffenbach's ordinary operation for ectropium of the lower lid differs from that given in the text, and will be understood from the two following figures. A triangular portion of integument, including the cicatrice, being removed, the incisions *c a*, *c a*, (*Fig.* 21.) are extended freely on each side, to allow of the ready approximation of the two sides, *b*, *b*. These being fixed by sutures, the two cut margins, *a c*, *c a*, are

connected to the corresponding margin of the lower lid, included between *c c*. The appearance after the sutures are applied is such as is represented in *Fig.* 22. See Review of Zeis's Handbuch der plastichen Chirurgie; Berlin, 1838; in the British and Foreign Medical Review for April 1839, p. 406.

[20] Ammon's Zeitschrift für die Ophthalmologie; Vol. iv. p. 428; Heidelberg, 1835. Staub de Blepharoplastice, p. 98; Berolini, 1835.

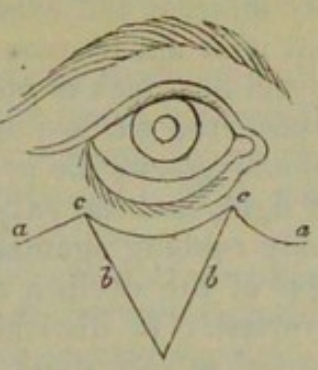

Fig. 21.

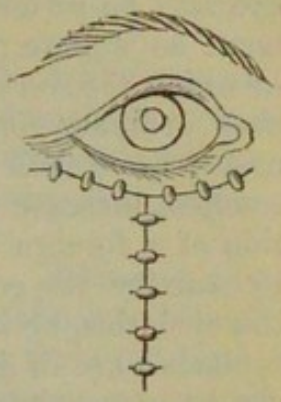

Fig. 22.

[21] British and Foreign Medical Review, April 1839, p. 406.

[22] Zeitschrift für die Ophthalmologie; Vol. v. p. 313; Heidelberg, 1836.

[23] Ibid. Vol. I. p. 49; Dresden, 1831.

SECTION XXXI.—TRICHIASIS AND DISTICHIASIS.

Trichiasis is an inversion of the eyelashes; distichiasis means a double row of eyelashes, the inner row, or pseudo-cilia, as they are termed, being turned in upon the eyeball. The fact is, however, that what are called pseudo-cilia in distichiasis, although they issue from the skin at a wrong place, and grow in a wrong direction, are not new productions, but merely natural cilia, the bulbs of which have been displaced by disease affecting the border of the eyelid.

Symptoms. We very seldom find all the eyelashes turned towards the eyeball, except when the trichiasis is merely a symptom of inversion of the edge of the eyelid, a disease which we leave out of view for the present, and even when it is a symptom of inversion of the edge of the eyelid, the trichiasis is often partial. In the same manner, the displaced cilia in distichiasis, (*Fig.* 23.) seldom occupy the whole length of the eyelid, but in most cases are strewed here and there in parcels, between the natural cilia and the Meibomian apertures, but generally nearer to the latter.

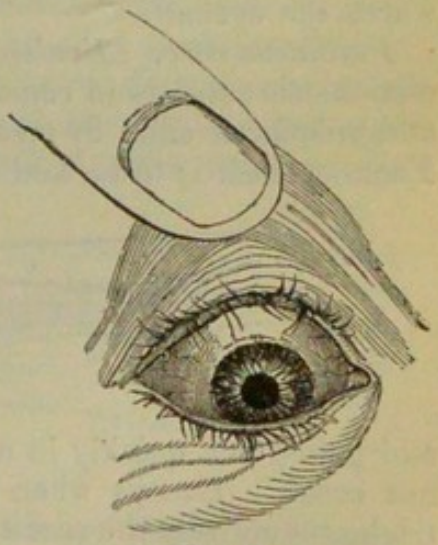

Fig. 23.

When only one or two small colourless eyelashes are inverted, they are apt to escape being noticed, and the diseased appearances of the eye, which are owing to their irritation, are supposed to be occasioned by some disorder of the eyeball itself. Means are even directed against the effects while the cause is overlooked, and the

eye may be seriously injured, and even vision lost, from a derangement so minute that it is apt to pass unobserved. In every case in which recovery from an attack of ophthalmia proceeds with more than ordinary slowness, the surface of the cornea continuing dim and strewed with blood-vessels, the eye discharging tears upon the smallest increase of light, and the patient complaining of the sensation of a foreign body rubbing against the eye, we ought carefully to examine the edges of the eyelids, and discover whether any of the eyelashes be inverted. In distichiasis especially, the displaced eyelashes are in general so soft, short, and light-coloured, that they can be seen only when the eyelids are opened wide, but at the same time allowed to remain in contact with the eyeball. The moment that the edge of the lid is drawn forwards from touching the eyeball, the displaced cilia are scarcely or not at all visible. On again applying the edge of the lid to the eyeball, they return into view.

Trichiasis and distichiasis affect the upper much oftener than the lower eyelid. This may perhaps depend on the natural disposition of the borders of the two eyelids; the border of the upper being directed downwards and inwards, while that of the lower is turned upwards and outwards.

Causes. Trichiasis and distichiasis are in an especial manner the consequences of neglected catarrhal ophthalmia, scrofulous ophthalmia, and ophthalmia tarsi. Small-pox was formerly a very abundant source of these derangements of the cilia. In fact, every affection of the lids attended with abscesses and ulcers at the roots of the eyelashes, is apt to give rise to trichiasis and distichiasis, especially if the patient is allowed to lie much on the face, so that the cilia, loaded with mucus, or matted together by the diseased secretion of the Meibomian follicles, are forced into a constant direction towards the eyeball.

Palliative cure. Evulsion. The palliative cure of trichiasis and distichiasis consists in removing one after the other, all the inverted and misplaced cilia, by means of a proper pair of forceps. (*Fig.* 24.) Each eyelash is to be laid hold of as close as possible to the skin,

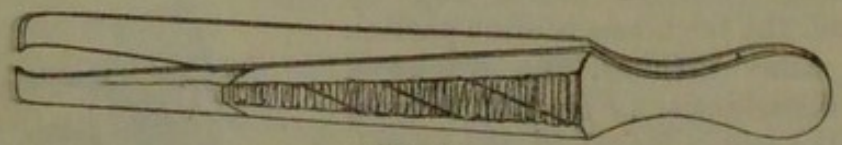

Fig. 24.

and pulled out quickly in a straight direction, in order that it may not break. Except when the edge of the lid is perfect, and the trichiasis entirely the result of the cilia having been matted together by mucus, this operation must be regarded as calculated to afford merely temporary relief. Carefully and frequently repeated, it occasionally proves, even in cases of distichiasis, especially in young subjects, a radical means of cure; but on this we cannot depend, and, therefore, as soon as the inverted or displaced cilia re-appear, they must again be extracted. We meet with patients who for

many years have been obliged, every eight days or oftener, to have this repeated.

Radical cure. The constant repetition even of the trifling operation of evulsion being found by many extremely annoying, we are often asked whether there is no means by which trichiasis or distichiasis can be permanently removed. With this view, the following plans have been had recourse to:—

1. *Restoring to the cilia their natural direction.* Although the proposals which have been made for restoring the cilia in trichiasis to their proper direction, such as constantly turning them outwards, keeping the lids everted by adhesive plaister, &c. are in general of as little value as is the burning of the foramina whence the eyelashes issue, with a red hot needle, for hindering the growth of displaced cilia, still the old practice of turning the distorted hairs into their proper direction, and cementing them to the other cilia, is not altogether to be despised. When the distorted hairs are long, by keeping them for a fortnight or three weeks glued to the neighbouring eyelashes, a cure may sometimes be effected. For this purpose, the strongest alcohol is to be poured upon shell-lac, coarsely powdered, in such quantity as will make a tough varnish, scarcely fluid; and a little of this is to be taken up on the point of a bit of wood, and applied to the distorted hairs and those beside them, matting them together, and keeping all in the proper direction by repeated touches, until the varnish hardens, which it speedily does by the evaporation of the alcohol. The clot thus formed, must be daily examined, and retouched wherever it has given way.[1] This practice will be of no service in distichiasis.

2. *Cauterization of the skin of the lid.* Cases of trichiasis occur in which for a considerable space along the edge of either lid, the eyelashes instead of standing out horizontally with their natural curve, are directed perpendicularly, so as to cling to the surface of the eyeball, and this without any irregularity or disorganization of the edge of the lid. In such cases, a smooth and slightly hollowed horn spatula, (*Fig.* 25.) grooved transversely a little way from its

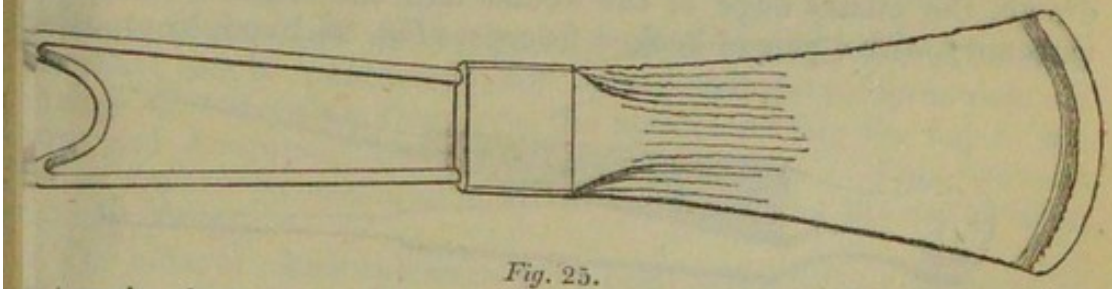

Fig. 25.

extremity, is to be passed between the eyeball and lid, in such a way that the edge of the lid shall rest in the transverse groove, and the lid be put on the stretch by pressing the spatula a little forwards. A small flat cautery, about the twentieth of an inch in thickness, heated to a white heat, is then to be drawn along the skin of the lid, parallel to, and at the distance of about the twentieth of an inch from the eyelashes. The same cauterization may be effected by a

pencil of pure potash, pointed by dipping the end of it in water. When the eschar separates, a slight ectropium will result from the contraction of the cicatrice, and the eyelashes will resume their natural direction.[2]

The direction of single inverted hairs may be corrected by running the point of a lancet into the edge of the lid immediately to the outside of the root of the hair, and inserting into this little wound a speck of pure potash, thus producing a small ulcer, which in cicatrizing alters the direction of the hair.

3. *Amputation of the edge of the eyelid.* Some operators have contented themselves in cases of trichiasis with the simple, but not very ingenious plan of paring away the edge of the eyelid, removing in this way that part of the lid whence the cilia grow, as well as the Meibomian apertures.[3] I remember seeing a Jew girl in Vienna, who had been operated on in this manner, by Dr C. Jäger. The pain and inflammation of the eye, and the opacity of the cornea, caused by the inverted lashes, were of course removed, and the deformity, produced by this curtailment of the lids, was very trifling. A perpetual tendency to lippitudo, however, must follow the obliteration of the Meibomian canals.

4. *Extirpation of a stripe of the integuments, along with the bulbs of the cilia.* The operation proposed by Professor Jäger, for the cure of trichiasis, is different both from Mr Saunders' extirpation of the cartilage, and from the paring of the edge just mentioned. It consists in removing that portion of the integuments under which lie the bulbs of the cilia, leaving the cartilage, and, as far as possible, the Meibomian apertures, entire. The bulbs of the cilia must be removed, the lacrymal canals and puncta being preserved; if the trichiasis is only partial, then the operation is to be limited to the part where the eyelashes have a wrong direction.

The horn spatula (*Fig.* 25.) being introduced beneath the eyelid, and the skin put on the stretch, the skin, and orbicularis are to be divided, with a small scalpel, by a transverse incision, parallel to, and about a line from, the diseased cilia: the spatula is now withdrawn, the ciliary edge of the wound laid hold of, at its temporal extremity, with a pair of hooked forceps, (*Fig.* 26.) and, by repeated

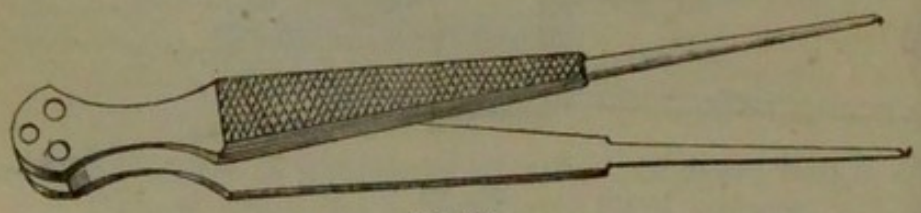

Fig. 26.

strokes of the knife, the outer margin of the lid, including the roots of the cilia, is dissected off in a stripe. The wound is left to cicatrize.

If any of the bulbs of the cilia have escaped extirpation, they appear like black points in the wound, about the third or fourth day after the operation. Caustic should immediately be applied to them, so that they may be destroyed.[4]

5. *Excision or destruction of the bulbs of the cilia.* The following operation is recommended[5] by Vaccà Berlinghieri, of Pisa.

The surgeon having ascertained the number of inverted eyelashes, and the extent which they occupy, with pen and ink traces a line on the skin, parallel to the margin of the eyelid, and at the distance of a quarter of a line from it. The line, drawn with the pen, should show upon the external surface of the eyelid, the exact space occupied towards its internal surface by the distorted cilia. The horn spatula (*Fig.* 25) is now to be introduced between the lid and the globe of the eye, so that the edge of the lid is placed on the grooved part of the convex surface of the spatula. With one hand, the assistant holds the spatula by the handle, while with the index and mid finger of the other hand he keeps the lid fixed and on the stretch. The surgeon now makes two small vertical incisions through the integuments, with the scalpel, commencing a line and a half from the edge of the eyelid, and terminating exactly at its edge. These two incisions inclose the space on which the line was marked with ink. A transverse incision, parallel to the line so marked, but nearer to the edge of the lid, is now to unite the two vertical incisions. The flap, circumscribed by these three incisions, is to be dissected from the subjacent parts and turned back. This brings the bulbs of the cilia into view. It is not, however, always easy to see and extirpate them, partly from the blood which conceals them, partly from the cellular tissue which renders it difficult to lay hold of them. The surgeon, therefore, must cleanse the wound well from blood, and be provided with a good pair of fine forceps, with which, and a small scalpel, or scissors, he may remove all that lies between the everted flap and the external surface of the tarsus. That being done, the operation is finished. The flap is replaced in its natural position, and kept so by a strip of court plaister.

If the inverted cilia are placed at a considerable distance from one another, and in the interval between them there are cilia growing naturally, Vaccà directs us to attack particularly the bulbs belonging to the distorted cilia, and not to uncover nor destroy the roots of the natural ones.

He confesses that the extirpation of the bulbs, in the manner described, might puzzle one not accustomed to perform delicate operations. He tried, therefore, the plan of raising the flap as before, and destroying the bulbs with nitric acid. This may be better applied by means of a bit of wood, than by the contrivance used by Vaccà.

The cilia, of which the bulbs have been dissected out, or destroyed, would come away, about the 6th day after the operation, but it is better to pull them out immediately.

I have repeatedly assisted my colleague Dr Rainy, while he performed the following operation for trichiasis or distichiasis.

Everting the eyelid, and laying hold of it with a pair of forceps, he made an incision, with an extraction-knife, close and parallel to the inner edge of the border of the lid, and then another between

the natural row of cilia and the inverted or displaced ones. He then extirpated the piece of the lid intervening between these two incisions, including the morbid cilia and their bulbs. It is difficult to make the incisions deep enough, owing to the firmness of the cartilage and other textures.

6. *Excision of a wedge-shaped portion of the lid.* When four or five eyelashes, in a bundle, turn in upon the eye, we may cut out a triangular or narrow wedge-shaped piece of the whole thickness of the lid, including the faulty eyelashes, and bring the edges of the wound together by stitches, as in the operation recommended by Sir William Adams for the cure of eversion.

False eyelashes are sometimes met with growing from different parts of the conjunctiva, even from the conjunctiva corneæ. Dr Monteath mentions[6] a case, in which one exceedingly strong hair grew from the inner surface of the lower lid. It was directed perpendicularly towards the eyeball, and irritated it. The natural cilia were of a light colour, the pseudo-cilium jet black, and double the strength of the common cilia.

I once met with an eyelash fully an inch in length, soft, and woolly, in a patient who had long suffered from ophthalmia.

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[1] Jacob, in Dublin Hospital Reports; Vol. v. p. 394; Dublin, 1830.

[2] Chirurgie Clinique de Montpellier, par Delpech; Tome ii. p. 295; Paris, 1828.

[3] Hosp, Dissertatio sistens Diagnosin et Curam Radicalem Trichiasis, Distichiasis, nec non Entropii; Viennæ. Contained in Radius's Scriptores Ophthalmologici Minores; Vol. i. p. 199; Lipsiæ, 1826.

[4] Heisteri Institutiones Chirurgicæ, Vol. i. p. 514; Amstelædami, 1750. Schreger, Chirurgische Versuche; Vol. ii. p. 253; Nürnberg, 1818.

[5] Nuovo Metodo di curare la Trichiasis; Pisa, 1825.

[6] Translation of Weller's Manual; Vol. i. p. 115; Glasgow, 1821.

SECTION XXXII.—ENTROPIUM, OR INVERSION OF THE EYELIDS.

Exclusive of traumatic entropium, there are two varieties or degrees of this disease, which differ materially in their causes, symptoms, and modes of cure. The one is *acute*, the other *chronic*. The first is attended with little organic change of the affected lid, the second with much; the first is most frequently met with in old persons, the second in young; the first in healthy, the second in scrofulous subjects; the acute is a disease chiefly of the tegumentary, the chronic chiefly of the conjunctival surface of the lids.

1. The *acute* variety generally takes its origin in an attack of ophthalmia, during which the patient kept the eyelids long shut, perhaps covered with a poultice, or pressed inwards by a bandage. I have repeatedly seen it take place during the inflammation follow-

ng extraction of the cataract. The lower lid is the seat of this ariety of inversion; at least, I have never seen it affect the upper lid. The skin of the inverted lid is gener-lly swoln and puffy. Its edge is per-ectly regular in form, not thickened or indurated, but entirely rolled back owards the eyeball, so that the eye-ashes are fairly out of sight. (*Fig.* 7.) On applying the finger to the uter surface of the lid, and drawing t a little downwards, the eyelashes tart into view, clinging to the surface f the eyeball; a little more traction olls the edge of the lid completely into its natural place, and there s no appearance of trichiasis. If we cease making pressure on the id, it remains for a minute or two in its proper position, and then ith a sudden jerk, becomes inverted as before.

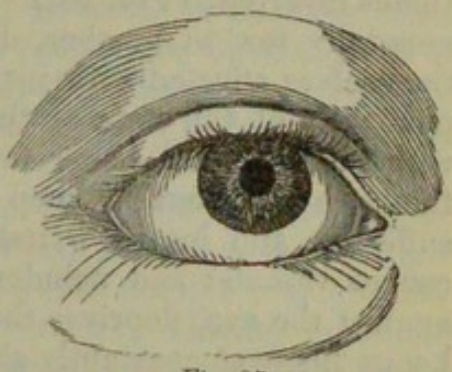

Fig. 27.

This kind of inversion appears to be owing partly to the swoln tate of the integuments, partly to an irregular or imperfect action f the orbicularis palpebrarum. The circumferential part of the uscle seems to have lost its wonted power of supporting the body f the lid, while its ciliary portion continuing to act, rolls the edge f the lid into the inverted position. We meet with this variety of ntropium almost exclusively in elderly persons, in whom the skin as already lost its natural tension, so that it falls into folds, parti-ularly about the eyelids. A superabundant state of the skin evi-ently favours the inversion.

The eyeball is much irritated by the eyelashes rubbing against it n the act of winking, and hence the patient keeps the eye shut, and s much as possible at rest. He even squeezes the lid so much ogether as to bring the skin of the upper and lower lids into con-act. The eye waters much, and the tears fret and excoriate the kin of both lids. The corneal conjunctiva becomes inflamed; and ne consequence of neglecting the inversion, may be total opacity of ne cornea.

This variety of inversion is an occasional attendant on catarrho-heumatic or arthritic ophthalmia, along with severe circumorbital ain, and sometimes with ulceration of the cornea. In such cases, ot only must the entropium be removed, but at the same time enesection, calomel with opium, and other remedies must be used, o cure the ophthalmia.

2. The *chronic* variety of inversion is the result of long-continued phthalmia tarsi, or neglected catarrhal conjunctivitis. The upper d is equally liable to be affected as the lower, and often both are nverted at the same time. The edge of the affected lid is thickened, regular and notched, and shortened from canthus to canthus, so nat it presses unnaturally on the eyeball.[1] The cartilage is in-urated, as well as inverted. No degree of traction which we em-loy is sufficient to roll the lid into its natural situation; we may

drag it from the eyeball, and bring the cilia into view, but still the edge of the lid continues inverted. (*Fig.* 28.) The cilia are generally few in number, dwarfish, and themselves affected with inversion, independently of the state of the lid. Notwithstanding their being few and small, they are sufficient to keep up constant suffering, and by the irritation which they occasion, to render the cornea vascular and nebulous. The pain they induce by rubbing against the eye, deprives the patient of the enjoyment of sight; he keeps his eyes constantly shut, and avoids all circumstances which would produce motion of the lids or of the globe of the eye. At length, the cornea becomes quite opaque, and its conjunctival layer acquires a degree of morbid thickness and insensibility, which renders the pain attending the disease less distressing. Long previously to this, however, the whole conjunctiva has, in general, lost its secretive power, and become dry or cuticular.

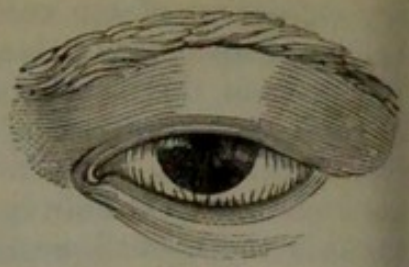

Fig. 28.

Irregular action of the orbicularis palpebrarum may also have to do with the production of this kind of inversion, but it is evident that the structure of the lid is here much more impaired. Inflammation has altered the conjunctiva, the perichondrium, and even the cartilage itself. Repeated ulcerations have destroyed the form of the edge of the lid, notched it with cicatrices, and permanently fixed it in the state of contraction and inversion.

3. *Traumatic* entropium is generally the result of a scald or burn of the conjunctiva, or of the intrusion of some caustic substance, as quicklime, into the sinuses of the eyelids. It is often conjoined with a degree of symblepharon, and sometimes the cartilage seems partially destroyed by the injury.

Treatment. 1. The treatment of the *traumatic* variety will depend on the degree of the disease; in slight cases, the operation about to be described as suitable for acute inversion will be sufficient; in worse cases, a similar plan of cure as that pursued in chronic inversion, may be necessary. As the one of these two kinds or degrees of inversion is much less complicated in its symptoms than the other, so is the method of cure: for the one simple, for the other complex.

2. In every case of inversion, acute or chronic, it is proper to endeavour to remove the conjunctival or the tarsal inflammation, in which the misplacement of the lids has originated. This is greatly promoted, in most cases, by cleanliness, fresh air, and a proper attention to diet. The ophthalmia must be treated with the remedies which its peculiar nature demands; and on this point the reader may consult the sections on ophthalmia tarsi, catarrhal and catarrho-rheumatic ophthalmiæ. We meet with many cases, in which an operation for entropium is the only means which can remove the ophthalmia, and save the eye.

3. *Acute* entropium sometimes, but, it must be confessed, very rare

y, subsides under antiphlogistic means, aided by such mechanical contrivances as keep the lid in its natural place. For this purpose, strips of court plaister may be applied so as to cross each other upon the middle of the lid; or a small pad, sewed upon a piece of tape, may be made to press upon the lid, the tape passing over the nose, and under the ears, crossing on the occiput, and tying on the forehead.

In this variety of inversion, when we take hold of a transverse fold of the skin of the inverted lid, the displacement is for the time removed, and the patient can open and shut the eye without difficulty, and without any return of the inversion. Having laid hold then, of the fold of skin with a pair of broad convex-edged forceps (*Fig.* 13, page 180), remove it with the scissors, bring the edges of the wound together by two stitches, and as soon as union is completed, the inversion will be found to be cured.

So much skin as is sufficient to overcome the inversion, and neither more nor less, is to be removed. After laying hold of the fold with the forceps, the surgeon must observe whether the cilia appear in their natural place, and have their proper direction. If they still incline inwards, the fold is too little, and more of the skin must be laid hold of; if the cilia not only incline outwards, but the conjunctiva is brought into view, the fold is too broad, and less skin must be grasped with the instrument. In old people, it is sometimes necessary to remove a very broad piece of skin. Care must always be taken to leave sufficient integument between the cilia and the edge of the wound, for the insertion of the stitches.

If this variety of inversion has lasted a considerable time, and in addition to the mere displacement of the lid, consequent to the morbid state of the skin, and irregular action of the orbicularis, there appears some unnatural disposition of the cartilage to turn inwards, it may be proper after removing the cutaneous fold, to snip off a few fibres of the muscle, so as to form a firmer cicatrice, actually fixed to the cartilage.

The portion of skin to be removed might be destroyed by the actual cautery, or by escharotics, but the operation just described is greatly better. The escharotic employed by Helling[2] and Quadri,[3] for this purpose, is concentrated sulphuric acid, which is applied in the following manner:—

The skin of the inverted lid, to the breadth of about three lines, and one line from its tarsal edge, is to be rubbed with the acid, by means of a pencil of wood dipped in it, with the precaution of not taking up more than what merely wets the pencil. After ten seconds, the part is to be dried, and the acid re-applied, and this even a third or a fourth time, until a sufficient eschar has been formed, or a marked contraction has taken place. The part is then to be carefully washed. Of course, great care must be taken that none of the acid get into the eye. After a time, it may be necessary to repeat the operation.

4. In *chronic* entropium, neither the operation with the scissors,

nor the application of escharotics, is, in general, of any use. In slight cases, however, where the tarsus is but little affected, it may be proper to try the effect of removing a fold of skin. Acute inversion is curable by an operation on the skin, by shortening in fact the skin of the affected lid; but in chronic inversion, we generally find that nothing done to the skin merely, is of much service. Portion after portion of it may be removed in advanced cases of this variety of inversion, but the disease continues as before. The altered condition of the tarsus prevents the lid from resuming its natural position. The lid, then, must be attacked in a different way. Mr Saunders[4] cut out the tarsus of the upper lid altogether, along with the roots of the cilia; others have amputated the entire edge of the lid, or extirpated the bulbs, as has been explained in the preceding section.

As an evident shortening of the lid in the transverse direction attends the inveterate cases of this kind of inversion, and produces a degree of constriction on the eyeball, an idea suggested itself to Mr Ware, that the lid in such a state might be relieved by a perpendicular incision through its whole thickness, either at its temporal extremity or in its middle. Such an incison would at least release the eyeball from the state of pressure caused by the contracted lid.

It was probably from this hint of Mr Ware, that Sir Philip Crampton was led to devise the operation which is now generally adopted in inveterate cases of chronic inversion. Supposing it to be the upper lid which is affected, it is to be divided perpendicularly, for the length of from a quarter to half an inch, close to its temporal extremity,[5] with straight probe-pointed scissors. A similar incision is then to be made at the nasal extremity of the affected lid, taking care to avoid the lacrymal canal.[6] These incisions being made, the eyelid immediately feels unconfined, it can be lifted from the eyeball, and the patient is already freed from a great part of his uneasiness. Were we now to leave the lid to itself, it would speedily resume its former place, the incisions by which we had liberated it would unite by the first intention, and no permanent relief would be effected. To prevent immediate union, Sir Philip Crampton employed an instrument similar to Pellier's speculum, by which he kept the eyelid constantly suspended, and permitted only a slow union by granulation. Instead of using the speculum, it is better to remove a fold of the skin of the affected lid, exactly as in the operation for acute inversion; by two or three stitches, bringing together the edges of the wound, made by the removal of this fold; and then by means of three ligatures, (*Fig.* 29) inserted through the edge

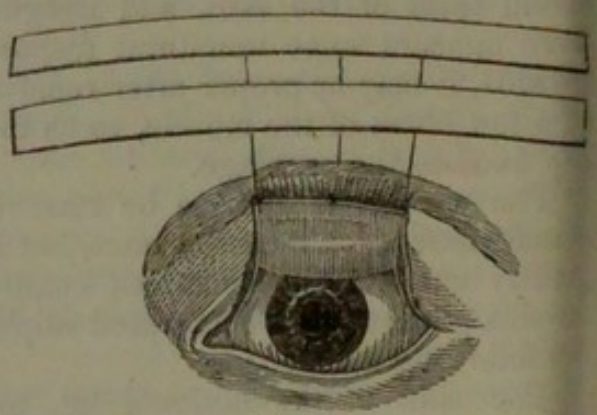

Fig. 29.

of the lid, and fixed to the forehead by strips of plaister, to keep the lid elevated for eight or ten days. Over the everted lid, a bit of spread lint is to be applied, and a roller round the head. The perpendicular incisions slowly fill up by granulation; the slower the better; we ought daily to separate their edges with the probe, and touch them with sulphate of copper, to hinder them from healing rapidly; the union, when at length completed, does not comprehend the orbicularis palpebrarum; the divided fibres of the muscle shrink, like the divided ends of every other muscle; the diseased cartilage, in the mean time, loses also much of its induration and irregularity, and thus the lid, when re-united, is found improved in structure, and almost natural in position.[7]

Mr Wharton Jones informs me, that in chronic cases of inversion of the lower eyelid, he has performed the following operation, with perfect success. Having made an incision through the whole thickness of the lid, perpendicular to its edge, near the outer canthus, he cuts out a piece of the skin, and then fixes the lid in the everted position, as in Sir Philip Crampton's operation.

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[1] See Ammon on Phimosis Palpebrarum, in Zeitschrift für die Ophthalmologie; Vol. ii. p. 140; Dresden, 1832.

[2] Hufeland's Journal, 1815; St. 4. p. 98.

[3] Annotazioni Pratiche sulle Malattie degli Occhi; Vol. i. p. 69; Napoli, 1818.

[4] Treatise on some practical points relating to the Diseases of the Eye, p. 41; London, 1811.

[5] If the incision, as directed in the text, is made close to the temporal extremity of the lid, it will cut through the glandulæ congregatæ, and some of the lacrymal ducts. Unless the inversion extends, therefore, to the very angle, it may be proper to avoid these parts, by keeping a few lines from the extremity of the lid, and towards the nose.

[6] Sir Philip Crampton cut through the lacrymal canal; but ever since I began to give lectures on the eye, in 1818, I have directed this to be avoided. I have always discountenanced also the transverse incision of the conjunctiva, recommended by Sir Philip, and particularly insisted on the propriety of following up the first steps of this operation, by the extirpation of a transverse fold of the integuments.

[7] Essay on the Entropeon; by Philip Crampton, M.D; London, 1806. Lectures on the Operative Surgery of the Eye; By G. J. Guthrie, p. 31; London, 1823. Jacob, in Dublin Hospital Reports; Vol. v. p. 389; Dublin, 1830.

SECTION XXXIII.—ANCHYLOBLEPHARON.

This, although strictly a disease of the eyelids, I shall consider along with symblepharon, in a following chapter, among the diseases consequent to the ophthalmiæ.

SECTION XXXIV.—MADAROSIS.[1]

Partial madarosis is common after small-pox, the pustules seated on the edge of the eyelid destroying the bulbs of the cilia by ulceration. Neglected ophthalmia tarsi is apt to end in a more extensive madarosis of the same kind. The cilia of which the bulbs have been destroyed, cannot be reproduced. Both the cilia and the hairs of the eyebrow are liable to fall out, from different constitutional diseases; but in this case they generally grow again. The want of the eyelashes and hairs of the eyebrow is productive of frequent nictitation, in order to moderate the glare of day, and prevent the entrance of foreign particles into the eye.

Case 134.—I was consulted, some time ago, by a man who had lost every hair of his body. His head was perfectly bald, he had no eyebrows nor eyelashes, his beard was gone, no hair in the armpits, on the pubes, nor on the limbs. He was anxious to regain chiefly the eyebrows and eyelashes, as he found his eyes much weakened by the want of them. He was inclined to attribute his disease to some slight venereal complaint, which had been cured by mercury.

The treatment, both local and general, already recommended for ophthalmia tarsi, must be carefully adopted in cases of threatened madarosis. In constitutional cases, tonics are to be employed both internally and externally, as it is evident that weakness has much to do in the production of the disease. Cinchona is particularly recommended internally, and an infusion of the petals of the rosa centifolia in wine as a collyrium. When there is a suspicion of syphilis being the cause, mercury and sarsaparilla should be tried. In such a case as that which I have related, artificial eyebrows may be applied with advantage.

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[1] From *μαδὸς*, *bald*.

SECTION XXXV.—PHTHEIRIASIS.

Phthiri or crab-lice sometimes lodge among the cilia and eyebrows, where they keep up a chronic inflammation, and cause intolerable itching. They are so small that they may escape observation, unless a lens is employed in examining the parts.

"A child came to the Infirmary," says[1] Mr Lawrence, "complaining of the eyes being sore, and said they itched very much. I looked at the eye, and could not see much the matter, but I thought that the cilia had rather a thick appearance, and on a more accurate examination, I found that this was caused by an infinite number of pediculi sticking over the hairs. I ordered the free application of the citrine ointment, and wished to see its effect; but the mother, who came with the child, was so much offended at being told the cause of the complaint, that she did not bring the child back again."

In such cases, some mercurial salve, as that recommended by

Mr Lawrence, and attention to cleanliness, will generally be effectual; although the disease sometimes resists mercurial salves for a considerable time. After rubbing the eyebrow or edge of the eyelid with mercurial ointment, or bathing the part with a solution of two grains of corrosive sublimate in an ounce of distilled water, taking care to avoid the eyeball while using the latter application, we should endeavour to dislodge the phthiri with a small spatula or forceps. This should be repeated twice or thrice a-day.

[1] Lectures in the Lancet, Vol. x. p. 323; London, 1826.

CHAPTER IV.

DISEASES OF THE TUNICA CONJUNCTIVA.

The principal morbid affections of the conjunctiva fall under the heads of the *Ophthalmiæ*, and *Consequences of the Ophthalmiæ*. There are, however, a few diseases of this portion of the tutamina oculi, which, I conceive, it will be convenient to introduce here. We have considered the diseases of the secreting lacrymal organs; the tears flow from them over the conjunctiva; this conducting organ of the tears seems then naturally to claim our attention, before proceeding to the excreting lacrymal apparatus.

The conjunctiva is a muco-cutaneous membrane, connected to the neighbouring parts by cellular substance. This cellular substance is liable to phlegmonous inflammation, inflammatory œdema or chemosis, and to ecchymosis, and emphysema; while the conjunctiva itself is chiefly subject, on the one hand, to blenorrhœal inflammation, and, on the other, to eruptive diseases. We meet with fungus, warts, and tumours of the conjunctiva. In some cases, its papillary structure is affected by a morbid degree of development; while, in other cases, the conjunctiva seems to lose its faculty of secreting mucus, and becomes dry and contracted. The compound nature of the membrane, expressed by the term *muco-cutaneous*, serves as a key to its pathology.

SECTION I.—FOREIGN SUBSTANCES ADHERING TO THE CONJUNCTIVA.

1. Particles of dust, bits of straw, parings of the nails, the nibbings of pens, small insects, and the like, getting into the eye, to use

the common phrase, by which is meant getting into the conjunctival cavity, are gradually ejected by the natural movements of the eyelids, the upper lid bringing them down in the act of nictitation, while the lower shoves them on towards the nose, till they are fairly placed on the caruncula lacrymalis, whence, perhaps some hours after their intrusion, the instinctive application of the finger removes them entirely. If the foreign substance, however, adheres to any part of the conjunctiva, it then gives more than ordinary uneasiness, and the patient either makes attempts himself to withdraw it immediately, or seeks relief from the hand of another. His own attempts are often fruitless, and it is amazing how often medical practitioners dismiss, unrelieved, those who apply to them under such circumstances, simply from not everting the upper lid, on the inner surface of which, in nine cases out of ten, the foreign body will be detected.

Blown into the eye by the wind, foreign particles, in general, adhere merely to the conjunctiva, often to the conjunctiva corneæ, and rarely penetrate into or under that membrane. If they are lying on the surface of the ocular conjunctiva, they are seen at once on opening the eye, and are easily removed with the point of a tooth-pick, or the edge of a small elastic silver spatula. (*Fig.* 30.)

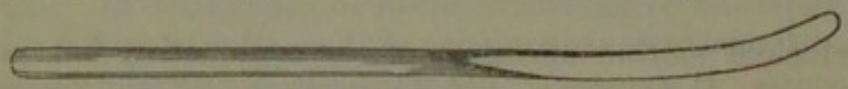

Fig. 30.

The latter instrument answers extremely well for the removal of particles adhering to the surface of the cornea, or imbedded in its conjunctiva.

It is remarkable that those very minute foreign bodies of a black colour, called *Stahlfunken* by the Germans, and occasionally styled *fires* in this country, are never met with over the sclerotica, but only on the cornea, sometimes just at its edge, but generally near its centre or on its lower half. Notwithstanding their general resemblance, they are not all of the same nature. Sometimes they are particles of iron, which have been projected in an ignited state against the eye, when a person is striking fire with flint and steel, sharpening iron instruments, and the like. It was not an improbable supposition of Weissenborn, that such particles are angular, and likely by the sharpness of their points, to wedge themselves into the cornea. Dr Schindler, however, has shown[1] that they appear smooth and round, when viewed with the microscope. They lie more or less firmly in the little pit they form for themselves in the cornea; and, even when they remain there for weeks, leave no oxide behind them. On removing such bodies, no sloughy shreds of conjunctiva are found attached to them, nor is any brown burned spot left on the cornea.

In other cases, the foreign bodies in question consist of minute, unignited, metallic splinters, driven with force against the eye; as sometimes happens in filing or turning iron. Being sharp and angular, they remain firmly wedged in the corneal conjunctiva; their fine

points, having become oxidized, are apt to break off when the bodies themselves are removed, and form a reddish brown stain of the cornea. Shreds of the conjunctiva are not unfrequently found adhering to such particles.

Almost as common as the above mentioned are little black bodies, not of metallic origin, and often vegetable. Sometimes, on examining them with the microscope, they are discovered to be the germs of grasses; in other cases, particles of coal. With the naked eye, it is often impossible to distinguish between these and metallic particles.

Dr Schindler does not think the presence of such foreign bodies as have just been described, very productive of danger; and undoubtedly the eye is more frequently destroyed by the rude attempts of ignorant people to remove such bodies from the cornea, than by allowing them to remain. That they should always be removed, however, is certain, and if merely imbedded on the surface of the cornea, the best instrument for the purpose is the small spatula figured above. The operator raises the upper eyelid with his thumb, taking care not to touch the lower eyelid nor the cilia of either eyelid; he now tells the patient to look at him, and with the edge of the spatula the foreign body is in general easily unseated. This is not the method recommended by Dr Schindler, who uses a camel-hair pencil for the purpose; a safer instrument, certainly, than the extraction-knife, but which in many cases would be found insufficient to effect the object in view.

It sometimes happens that the irritation does not attract sufficient attention, so that the foreign substance is left adhering to the conjunctiva for days, or even for weeks, or months, bringing on inflammation, or even ulceration, without any attempt being made to discover the cause, or to remove it. On the surface of the cornea, this may give rise to a permanent speck or opacity.

2. Foreign substances, adhering to the eye, not unfrequently simulate the appearances of pustules, specks, &c. as the following cases will show.

Case 135.—Daniel Newton, aged 14, from Paisley, applied at the Glasgow Eye Infirmary, on account of considerable pain and inflammation of the left eye, which had continued for two months, notwithstanding the application of a salve, a sugar of lead poultice over the lids, leeches, and repeated blistering. There was a small semi-opaque elevation, running nearly in a perpendicular direction, and occupying the centre of the cornea. Its figure being different from that of any ordinary pustule or speck, I touched it with the convex side of a small hook, when it instantly separated from the cornea, and proved to be what, in Scotland, is known by the name of a meal-seed, that is a fragment of the husk of a grain of oats, about the sixth of an inch in length, and the fortieth of an inch in breadth. The cornea, where the foreign substance had adhered, appeared slightly nebulous. Eight days after, the inflammation was completely gone, the cornea natural, and vision perfect.

Case 136.—A child of three months was brought to me by its mother, who said that one of the eyes had been inflamed for six weeks, and that a speck had grown on it. Different remedies had been tried, and a blister recommended. On examining the eye, I found one half of the husk of a phalaris seed adhering to the cornea, a little below the level of the pupil, simulating, to an inexperienced

or careless observer, a speck or pustule. It was easily removed with the point of a tooth-pick.

Case 137.—An infant, 10 weeks old, was brought to me by its mother, who said there was a speck on one of its eyes, for which she had been using a solution of caustic, given by her medical attendant. She had observed the speck for three weeks, but knew no change in its appearance. It had exactly the colour of a thin leucoma, and did not seem in the least elevated; but as it was square-shaped, I immediately suspected it to be the fragment of some seed, and lifted it off with the spatula.

Case 138.—A child was brought to me with severe inflammation of one of its eyes, and puriform secretion from the conjunctiva. From under the edge of the upper lid there projected a black roundish body, which, at first view, I was afraid might be a protrusion of part of the iris through an ulcer of the cornea. The parents were of opinion that the eye was gone, and evidently laboured under some notion of the same kind as that which occurred to myself, when I laid down the child to examine the exact state of disease. How great was my surprise when, on raising cautiously the upper eyelid, I found this was a case, not of figurative, but of real *myocephalon!* A common house-fly was fairly lodged, and had been so for eight days, between the eyeball and the upper eyelid, its head only projecting in the manner described, and producing an appearance as if the eye were disorganized.

3. It is remarkable how tenaciously a foreign substance will adhere to the surface of the eye. The surrounding vessels become distended with red blood, and the portion of conjunctiva covered by the foreign body soon puts on a fungous appearance.

Case 139.—A child of 4½ was brought to me from the country, with a black substance firmly adhering to the conjunctiva covering the sclerotica. It was supposed to be a bit of coal, and several attempts had been made to remove it. Laying the child on its back, fixing its head between my knees, and steadily elevating the upper eyelid, I laid hold of the foreign substance with a pair of forceps. It came away, leaving the portion of conjunctiva which it had covered in an inflamed and fungous state. On examination, it proved to be half the husk of a hemp seed, which had stuck to the eye by its concave surface, and had become blackened by imbibing moisture from the conjunctiva. It had remained for seven days in the situation in which I found it.

4. If the foreign body is not visible on the surface of the eyeball, it will probably come into view, on drawing down the lower lid. If nothing is discovered in the lower sinus of the conjunctiva, then the upper is to be examined. This is done by making the patient lean his head back, and look towards the ground, while we raise the lid and look under it; or, we at once evert the upper lid, in the following manner. We lay hold of the eyelashes with the finger and thumb, and whilst by this means the edge of the lid is drawn outwards and upwards, a slight counterpoise is to be made with the round end of the small spatula, on the outer surface of the lid, opposite to the upper edge of its cartilage. Between these two forces the lid is readily everted, so that its internal surface is exposed. In many, indeed in most cases in which a particle of dust lodges in the eye, a single black point will be observed adhering to the inside of the everted lid, and can readily be removed. The foreign particle, however, may be a minute fragment of some transparent substance, and may not be detected, unless with the spatula or the point of the finger we go over the surface of the conjunctiva. The intolerable pain, and violent spasm of the orbicularis palpebrarum, which generally attend the presence

of a foreign particle fixed on the inside of the upper lid, subside almost immediately on its being removed.

If, after the foreign substance has been removed, the spasm of the orbicularis palpebrarum should still continue, which is particularly apt to be the case when the conjunctiva has been both mechanically and chemically injured, the patient ought to remove to a dark room, lie in bed, and keep a pledget, wet with cold water, over the eye. Should this fail to give relief, let a soft warm poultice, containing a quantity of aqueous solution of opium, be applied over the eye, in a thin linen bag.

The whole of the upper conjunctival sinus cannot be brought into view by eversion, so that if we have any reason to think that a foreign body is lodged in the remote part of the fold, we must wash it out by means of a syringe and tepid water, or employ the spatula in searching for it, and bringing it down.

5. It is remarkable, that while the smallest particle of dust, fixed on the inside of the cartilage of either eyelid, but especially the upper, generally gives rise to intolerable uneasiness, foreign bodies of considerable size may lodge in the deeper and looser part of the conjunctival folds for many weeks, without inducing any violent symptoms. The conjunctiva, in such circumstances, inflames and is apt to throw out a fungous growth, which may completely envelop the foreign substance, so as to hide it from view, and lead the practitioner to adopt a false notion of the case.

Case 140.—A young girl had a soft red fungous growing out of the eye, as large as a filbert. It was of some weeks' standing, and was attributed to a hurt inflicted by a straw striking the eye. The fungous originated in the conjunctiva where it is reflected from the lower eyelid to the eyeball. It was cut away; but in three weeks was as large as ever. It was again removed, and at the angle of reflexion of the conjunctiva, a bit of straw, half an inch in length, was observed and extracted. The cure was complete in a few days.[2]

Case 141.—A man consulted Dr Monteath on account of an inflamed state of his eye, induced by a fall, five months before, among some bushes in descending a steep mountain. He felt some part of his eye wounded at the moment, and had never enjoyed freedom from a tender state of it, from that period, though he had applied a great variety of medicines. On everting the upper eyelid, a fungous state of the conjunctiva was discovered very high up in the angle of reflexion of that membrane, and on examination with the probe, it was evident that a foreign body remained there. It was laid hold of, and extracted with the forceps, and proved to be a portion of a twig of a bush, $\frac{3}{4}$ths of an inch in length, and nearly as thick as a crow-quill. This substance had remained in the upper fold of the conjunctiva for five months, and had got into that situation without wounding the eye.[3]

Case 142.—A boy ten years of age, having lain during the night on a sheet upon which ears of corn had been thrashed, awoke in the morning with his left eyelids swoln and painful. Notwithstanding the use of topical emollients, an abscess formed in the upper lid, which burst below the eyebrow towards the temple, and left an opening which could not be closed by any of the means which were employed. In process of time, the lid began to turn itself outwards, its membrane swelling and protruding, till at length the eversion was enormous.

About eight months from the first appearance of any disease, the fungous excrescence, formed by the internal membrane of the lid, covered a considerable part of the upper hemisphere of the eyeball, and kept the lid so much everted, that its margin, especially towards the temple, was almost close to the eyebrow. Pressed upon with the point of the finger, the lid yielded readily, and appeared

as if it would have descended to cover the eye, had it not been for the intervention of this fungus, formed by its internal membrane.

As the fungus was dry and indurated, Scarpa ordered it to be covered for 24 hours with a bread and milk poultice; and then removed the whole of it with a stroke of the curved scissors, carefully avoiding the punctum lacrymale.

After the extirpation, a piece of straw, about an inch long, and half a line thick, was discovered in the fold of the fungus. The whole of the superfluous part of the internal membrane being now removed, the lid descended over the eye, so as to cover it properly. The operation was not followed by any remarkable symptom, and the boy, ten days afterwards, left the hospital so far cured, that no other defect remained, except a slight elevation of the lid near the external angle, where the abscess had burst.[4]

As there can be no doubt that the piece of straw was the cause why the ulcer of the lid, eight months after the bursting of the abscess, had not yet become cicatrized, it is wonderful how such a foreign body could have been forced through the lining membrane of the lid, without the child having been awaked by it.

6. The larvæ of insects are sometimes deposited between the eyelids, and may produce very serious mischief, as is well illustrated by the following case, related by M. Cloquet.

Case 143.—A man, of about 50, following the double business of public singer and rag-gatherer, fell asleep in the open fields in a complete state of intoxication. Flies of the species *musca carnaria* deposited their eggs in the entrances to the different natural openings of his body, between the eyelids, in the nostrils, in the ears, and in the prepuce. The larvæ of these insects being hatched, passed into the nose, the ears, the orbits, &c. Under the integuments of the cranium they formed large cavities, pierced with ulcerated openings, by which, on pressure, the larvæ escaped in thousands.

All the larvæ were extracted by the second day after the patient's entering the *Hôpital Saint-Louis*. The eyes were totally destroyed, and when the larvæ were removed through the perforations of the corneæ, the crystalline lenses escaped. The integuments of the upper part of the cranium fell into a gangrenous state, and the patient died a month after his admission, in a complete state of dementia, believing himself constantly pursued by assassins. The bones of the vault of the cranium were in part necrosed, and the dura mater and arachnoid inflamed.[5]

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[1] Ammon's Zeitschrift für die Ophthalmologie, Vol. v. p. 64; Heidelberg, 1835.

[2] Monteath's Translation of Weller's Manual of the Diseases of the Human Eye; Vol. i. p. 9; Glasgow, 1821.

[3] Ibid.

[4] Scarpa, Trattato delle principali Malattie degli Occhi; Vol. i. p. 170; Pavia, 1816.

[5] Pathologie Chirurgicale, par Jules Cloquet, p. 60; Paris, 1831.

SECTION II.—INJURIES OF THE CONJUNCTIVA.

§ 1. *Mechanical Injuries.*

1. Incised wounds of the conjunctiva rarely present themselves, without the sclerotica being also divided. I have seen, however,

several cases of this kind. In one of them the wound was inflicted with a sharp bit of glass. It healed readily, although the lips gaped more than I could have anticipated.

2. I have seen several cases of severe pain and considerable inflammation, following slight scratches of the conjunctiva corneæ, by the finger nails of infants carried in arms. Somewhat similar, only much more serious in their effects, are the slight abrasions of the corneal conjunctiva, happening to reapers, during harvest, from the ears of corn. My experience as to the danger in cases of this sort, agrees with that of Professor Walther, who states[1] that in the Isar district of Bavaria alone, from 50 to 60 eyes are annually lost from the inflammation originating in this kind of injury during harvest. The patients in this part of Scotland are chiefly females, and much of the bad effects is no doubt attributable to neglect. The internal textures of the eye inflame, the cornea becomes infiltrated with pus, and bursting, gives rise to staphyloma. The symptoms altogether bear a close resemblance to those of catarrho-rheumatic ophthalmia, and the most active measures are required to save the eye. Depletion, and mercurialization are necessary, together with the use of belladonna.

3. A foreign body, if hard and angular, may penetrate through the conjunctiva, and either be driven under the membrane for a considerable way, at once, by the projectile force with which it was sent against the eye, or afterwards be gradually insinuated under it by the pressure of the eyelids. In such cases, it is sometimes necessary to raise a portion of the conjunctiva with the hooked forceps, and snip it off along with the foreign substance. If this is not done, the conjunctiva heals over the foreign body, and the irritation ceases. Mr Wardrop[2] tells us, that in one case he found a piece of whinstone, enclosed in a sac of cellular membrane, lying close to the sclerotic coat, where it had remained for ten years prior to the person's death, without his experiencing the least uneasiness, or even suspecting its presence. The same author[3] quotes from Loder's Journal, the following instance of a foreign body, which, having penetrated the sclerotic conjunctiva, gradually advanced to the central part of the cornea.

Case 144.—A priest requested assistance for a dark speck on the cornea of his right eye, which greatly impaired his vision. Two years before, he suddenly experienced a little pain in that eye, and on examination, remarked on the white of it, below the upper lid, a black spot, which not hurting his sight, and the pain soon going away, he took no farther notice of the accident. After some time, he was aware that the spot had changed its situation, and appeared at the union of the cornea with the sclerotic. The speck continued its progress very slowly, but uninterruptedly; it came forwards on the cornea, and at last covered a portion of the pupil. There was a prominent hard spot upon the cornea, equalling in size a small lentil, but longer than it was broad. Many small red vessels appeared like streaks around it. The patient had no pain. The hardness of the speck and other circumstances, made the surgeon suspect that a foreign body was fixed on the eye. He made an incision over it, and, with the assistance of a magnifying glass, saw a black body, which he removed with the point of the knife, from the small cavity it had formed for itself in the cornea. It proved to be the hard wing-case of a beetle.

The change of place, in such cases, is to be attributed, I presume, to the pressure of the eyelids in the act of nictitation.

4. The stings of insects sometimes fix in the conjunctiva, and are to be carefully removed, either by a pair of forceps or the point of a cataract needle.

§ 2. *Chemical Injuries.*

1. Lime, whether in the state of quicklime, or slaked lime, or mixed with sand so as to form mortar, acts very injuriously on the conjunctiva. It is also apt to affect violently the proper substance of the cornea, and sometimes totally destroys the eye. One of the first effects observed to arise from the intrusion of lime, in any of the above-mentioned states, is that the sclerotic and palpebral portions of the conjunctiva become white, swell, and peel off, being in fact decomposed by the caustic action of the substance. The corneal conjunctiva suffers a similar change. This decomposition of the conjunctiva is produced very rapidly, so that it can very rarely be prevented by a removal of the lime. When the corneal conjunctiva has peeled off, in only a small portion of its extent, a shallow depression is visible on the surface of the cornea, with irregular edges. If the whole has separated, the proper substance of the cornea appears perfectly smooth, and presents more or less of a blue pearly whiteness.

The ultimate effects arising from the intrusion of lime into the eye, depend on the degree of causticity, the quantity, and the length of time that the substance has been allowed to remain in contact with the conjunctiva. Common mortar falling into the eye, and quickly removed, acts merely as a severe stimulant, causing increased redness, pain, and epiphora, followed by puro-mucous discharge from the conjunctiva. Allowed to remain for days in the conjunctival folds, I have seen mortar followed by sloughing of the conjunctiva, permanent nebula of the cornea, and partial symblepharon. Slaked lime, thrown into the eyes, acts more powerfully, and is apt to be followed, especially if not speedily removed, by complete opacity of the cornea, or even by suppuration of that part, and staphyloma.

Case 145.—A child, two years old, was brought to the Glasgow Eye Infirmary, who, three weeks before, had fallen among quick lime, which had intruded into both eyes. A poultice had been applied immediately after the injury, and no attempt made to remove the lime, or counteract its effects. On examination, I found the right cornea totally opaque, small, and deformed. There was no appearance of cornea in the left eye, which had shrunk to a very small flat stump.

Case 146.—Robert Gray, aged 13, a slater, was admitted at the Glasgow Eye Infirmary, 3d September 1838.

On the 28th ult. a quantity of mortar was thrown into his left eye. The skin of the left eyelids and cheek is inflamed, and the eyelids swoln. He is unable to open the eye, except to about half its usual extent. The conjunctiva covering the eyeball, and that lining the upper eyelid, presents a white scarred appearance; that lining the lower eyelid, is more natural. Shreds of the conjunctiva are coming away in a sloughy state. A considerable quantity of mortar is still lodged between the eyeball and the upper eyelid, being impacted between the

wo surfaces. The conjunctiva corneæ looks as if it had been immersed in boil-g water, especially the upper half of it. Vision of the injured eye is very dim; though he can read with it the large letters on the Infirmary card. The first ay after the injury, the eye was affected with severe burning pain, which sub-ded after the application of a poultice. At present, he does not make much mplaint of pain. He says his master removed a quantity of the mortar mmediately after the accident. When the eye is held open for a few minutes, e cornea appears to become quite dry, and when viewed through a lens presents e appearance of cuticle. Immediately on being shut, it becomes bedewed with ars, and assumes a less opaque appearance.

The remainder of the mortar was carefully removed when he came to the Eye nfirmary; the solution of nitrate of silver was applied to the conjunctiva; and ght leeches to the eyelids.

Sept. 4th. A good night. Opens the eye better. He was ordered a purging wder; the red precipitate salve to the edges of the eyelids at bedtime; a llyrium with wine of belladonna; and a blister behind the ear.

5th. Conjunctiva looks rather better. Moves the eye more freely. He had dose of sulphate of magnesia.

6th. Cornea rather clearer.

10th. Three leeches to the left lower eyelid.

12th. Lower half of cornea considerably clearer.

19th. Three leeches to the inner angle of the eye. Blister repeated.

22d. Diluted wine of opium substituted for the solution of nitrate of silver.

29th. A considerable part of the conjunctiva corneæ appears to have separated. Whole cornea more opaque. Conjunctiva less inflamed.

7th Oct. An evident deficiency in the conjunctival covering of the cornea. annot tell one finger from another with left eye.

28th. Left cornea smooth and clearer.

4th Nov. Continues to improve.

11th. A conjunctival frænum extending between the upper eyelid and margin the cornea, towards inner angle. Cornea still very nebulous. General appear-ıce of eye more healthy.

7th April 1839. Cornea much clearer, except towards its upper inner margin, the vicinity of the symblepharon. Reads a small type with left eye.

In whatever state the lime may have been, which has intruded ıto the eye, it ought instantly to be removed. For this purpose ıe eye is to be opened, the lids everted one after the other, and ith the finger nail, or the small spatula, every particle of the foreign ıbstance picked out. It often adheres pretty firmly to the con-ınctiva, so that the aid of forceps is necessary to detach it. After ɔ much has been removed in this way as seems possible, a continued ream of cold water should be sent over the eyeball and inside of ıe lids, by means of a syringe, or poured upon the parts from a :a-kettle, or some such vessel, so as to wash away every particle of ıe lime.

The patient should now go to bed, and keep the eyelids wet with a ɔmpress wrung out of cold water. The solution of the nitrate of lver (gr. iv–x to ʒi of distilled water) operates favourably in ɔating the puro-mucous conjunctivitis which follows, but the more :rious inflammatory symptoms must be combated by bleeding, ılomel and opium, and counter-irritation. Solution of acetate of ad must carefully be avoided, as the lead will be precipitated on ıe excoriated parts, and form opaque scales, which can seldom be :moved.

If the inflammation which follows is moderate, the conjunctiva

corneæ, in those cases where it peeled off, is slowly regenerated, and vision is perfectly restored. If the lime has acted more deeply, or severe inflammation ensued, the cornea may never regain its transparency.[4]

2. Particles of potash, nitrate of silver, and other caustic substances, must immediately be extracted from the eye, with the forceps, or any other instrument which is at hand. The mixture of the tears with such substances increases their destructive effects.

I once saw severe inflammation of the conjunctiva, with considerable sloughing in the lower fold of that membrane, from red precipitate in powder, which an ignorant pretender had applied, to cure a slight ophthalmia. The sloughy conjunctiva came away in firm white pieces, leaving a raw surface. By care symblepharon was prevented.

3. Hot and caustic fluids, such as boiling water, melted tallow, sulphuric acid, and the like, blister the conjunctiva, and bring on inflammation of a highly dangerous character. Indeed, after sulphuric acid has been thrown into the eyes, a piece of diabolical malice, the effects of which I have repeatedly had occasion to witness, the conjunctiva almost appears scarred, being white, soft, and swoln. It afterwards peels off, while the cornea rapidily becoming disorganized by infiltration of pus, ulceration, and sometimes sloughing, a raw surface is left both on the ball and on the inside of the lids, ready to unite and close the eye by an incurable and almost total symblepharon. In other cases partial symblepharon is the result. A stream of tepid water, or of a solution of 4 grains of subcarbonate of soda to the ounce of water, injected over the whole surface of the conjunctiva, is the remedy to be had recourse to in the first instance. The inflammation which follows is to be combated by general and local blood-letting, calomel and opium internally, and the use of belladonna externally. Every care is to be taken to prevent anchyloblepharon and symblepharon, by opening wide the lids from time to time, and anointing them with tutty salve.

It is worthy of remark, that dangerous symptoms, as onyx and iritis, are apt to occur, in such cases, weeks from the receipt of the injury, and after the immediate effects have subsided.

4. Vinegar, ardent spirits, and other stimulating fluids, thrown into the eye, occasion severe inflammation of the conjunctiva. From whiskey, I have seen an inflammation of the conjunctiva, sclerotica, and cornea arise, very difficult to be overcome.

5. Dr Ammon quotes[5] the case of a man, who, smearing the roof of the entrance to his house with melted pitch, had the misfortune to let a drop of that substance fall directly on the cornea, where it stuck so fast that the surgeons who were called were unable to loosen it, either by the application of instruments, or the use of an eye-water. The patient was advised to drop olive oil into his eye, and to cover it with a compress steeped in that fluid, the effect of which was that the pitch was speedily loosened, and quitted the eye without leaving any visible injury.

6. I have repeatedly seen the corneal conjunctiva raised into a blister and destroyed, by being touched with melted lead or with a piece of hot iron. The effects are slight in some instances, and severe in others. I have seen the conjunctiva readily reproduced under such circumstances, the cornea resuming its transparency, immediately in some cases, slowly in others. In children, the effects are generally more dangerous, the cornea suppurating and giving way, so as to leave the eye staphylomatous.

7. Gunpowder exploded into the eye fixes in the conjunctiva, and on the cornea, and must be carefully picked out with the small spatula, or the point of a cataract needle, else the membrane will close over the grains, so that they will remain indelible, and the cornea become opaque.

8. Other substances sometimes leave an indelible stain of the sclerotic conjunctiva, unless carefully removed, along with the injured portion of the membrane. I have seen an injury with a piece of coal produce a permanent black mark; and Dr Jacob mentions[6] that he had more than once seen the same thing arise from the thrust of a charred stick.

9. The conjunctiva often becomes indelibly stained[7] from the misapplication of nitrate of silver in solution, a remedy much abused by half-educated practitioners, who, unable to discriminate the proper occasions for its use, and too careless to apply it themselves, and watch its effects, hand it over to the patient, with a recommendation to employ it daily, till a cure is effected. At the end of six weeks or two months, the conjunctiva acquires, from this application, a light olive hue. If the solution has been strong, and used for months, the stain is much deeper, colouring not only the conjunctiva of the eyeball, but also that of the under eyelid, of a dirty greenish brown, productive of permanent and very obvious deformity. Incorporated in a cicatrice of the cornea, nitrate of silver sometimes produces a black stain; but this event is rare.

10. If a solution of acetate of lead be applied to any part of the conjunctiva in an excoriated or ulcerated state, the acetate is decomposed, and a white precipitate is deposited, which adheres tenaciously to the conjunctiva, and as the membrane heals, becomes fixed in the cicatrice. If this takes place in the conjunctiva corneæ, it may greatly impede the vision of the patient. The appearance produced by deposition of lead on the conjunctiva cannot be mistaken, its chalk-like impervious opacity easily distinguishing it from the densest cicatrice resulting from mere ulceration. In one case, I succeeded in separating a scale of lead which had been deposited on the cornea; but, in general, the lead is so incorporated with the cicatrice as to be immovable.

The inflammation which follows the various injuries we have considered in this section, not only varies much in degree, but is by no means of uniform character. When it confines itself to the conjunctiva, it is sometimes puro-mucous, sometimes eruptive. But it

frequently affects the proper textures of the eyeball; such as, the cornea, the sclerotica, or the iris. Of course, rest, and the antiphlogistic regimen are necessary in every case of injury of the eye. The local applications must be regulated by the peculiar symptoms excited, and even the internal remedies to be employed are not of that uniform sort with which inflammation, in less complicated parts of the body, is usually treated.

The grounds of this doctrine will be more fully explained under the head of *Traumatic Ophthalmiæ*.

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[1] Merkwürdige Heilung eines Eiterauges, p. 25; Landshut, 1810.
[2] Essays on the Morbid Anatomy of the Human Eye; Vol. i. p. 70; London, 1819.
[3] Ibid.
[4] Jacob, in Dublin Journal of Medical Science, Vol. ix. p. 75; Dublin, 1836. Wardrop, Op. Cit. Vol. i. p. 160, and Pl. v. fig. 3.
[5] Zeitschrift für die Ophthalmologie; Vol. ii. p. 155; Dresden, 1832.
[6] Dublin Hospital Reports; Vol. v. p. 371; Dublin, 1830.
[7] Ibid. p. 365.

SECTION III.—SUBCONJUNCTIVAL ECCHYMOSIS.

Extravasation of blood into the subconjunctival cellular membrane occurs from various causes, as blows on the eye, blows on the eyebrow, gunshot and other wounds of the head or face, fits of coughing, fits of epilepsy, &c. I have seen a slight blow on the forehead produce ecchymosis beneath the conjunctiva of both eyes. In some cases, no evident cause appears why the vessels should have opened, for the patient on awaking in the morning finds the conjunctiva of a deep red colour, without any pain being present, or any thing having happened likely to produce such an effect. Subconjunctival ecchymosis has sometimes been observed in Asiatic cholera. It occurs in purpura and in scurvy; and hæmorrhagy occasionally takes place from the conjunctiva in these diseases.

In ordinary cases, the extravasated blood is gradually absorbed, the conjunctiva becoming first yellow, and then resuming its natural appearance. A slightly astringent collyrium generally forms the whole treatment.

SECTION IV.—SUBCONJUNCTIVAL EMPHYSEMA.

We have already (page 171) explained, how, in cases of fractur of the nasal parietes, the eyelids are subject to emphysema, the ai passing from the nostril, through the fractured bone, into thei cellular membrane. From similar injuries, extending between th

nostril and the orbit, the cellular membrane which connects the conjunctiva to the neighbouring parts, is sometimes filled with air.

Should the swelling from the effused air, prove so great as to give rise to pain, or impede the motion of the eyeball or eyelids, the conjunctiva may, from time to time, be punctured, so as to let the air escape, till the fracture is supposed to be consolidated. The patient ought to avoid forcible blowing of the nose, by which this emphysema, as well as that of the eyelids, is apt to be induced.

SECTION V.—SUBCONJUNCTIVAL PHLEGMON.

The subconjunctival cellular membrane is occasionally the seat of phlegmonous inflammation. The affected part of the conjunctiva is injected with red vessels, much thickened, and after some days presents a prominence about the size of a split pea, which rarely goes the length of suppuration. This disease will easily be distinguished from any of the ophthalmiæ.

In one case, I observed an appearance resembling subconjunctival phlegmon precede an attack of syphilitic iritis, and in several cases, I have seen a similarly thickened and inflamed patch of the conjunctiva, not unlike a phlegmon, investing an attenuated portion of the sclerotica, with protruding choroid, all of which symptoms yielded to mercury. Such cases might readily be mistaken for phlegmon. They will easily be distinguished from syphilitic chancre of the conjunctiva. We might suppose slight injuries to be the most probable causes of subconjunctival phlegmon; but, in general, like phlegmonous inflammation in many other instances, it arises without any evident cause.

Blood-letting of any kind is scarcely ever necessary in this complaint. The patient should be purged. Warm fomentations to the eye are to be used. If the phlegmon goes on to suppuration, it is to be opened with the lancet.

SECTION VI.—SUBCONJUNCTIVAL ŒDEMA.

Subconjunctival œdema sometimes occurs in small patches, especially on the temporal side of the eyeball; producing a feeling as if some foreign body were lodged in the eye, and proving, in this way, very annoying. The œdematous patches generally shrink under the application of stimulants, such as a solution of nitrate of silver, or the wine of opium. If this treatment does not succeed, the œdematous bit must be snipped off. The wound heals in a few days, and the disease is not apt to return. Sometimes the œdematous

little fold degenerates into a cartilaginous state, rendering the snipping of it away still more necessary.

An œdematous state of the conjunctiva sometimes occurs more diffusedly, in old people of a relaxed habit of body. In one case, it came on in an old woman after an over-dose of rum punch, and continued for months. I have repeatedly seen it accompanied by an unnatural prominence of the eyeballs, as if they were pressed out by a swoln state of the orbital cellular membrane. I have also met with subconjunctival œdema as an attendant on hemicrania and circumocular neuralgia.

In the last mentioned cases, the patients derived benefit from venesection, calomel with opium, and sarsaparilla. Leeches round the eye, mercurial purges, red precipitate salve to the eye, and temperance appeared useful in some of the other cases.

The conjunctiva is affected with an inflammatory œdema in many of the ophthalmiæ; in none so much as in that which arises from phlebitis. In cases of this kind, the membrane becomes in the course of a few hours greatly distended by a colourless effusion of fluid, apparently sero-gelatinous. This is attended with severe pain in the eye, and the speedy extinction of vision, as I shall have occasion to state more fully hereafter.

SECTION VII.—PTERYGIUM.

The term *pterygium*[1] is applied to a disease which consists chiefly in a thickened and elevated portion of the conjunctiva of the eyeball, of a triangular form, its base generally turned to the caruncula lacrymalis, while its apex advances towards the edge, or stretches even as far as the middle of the cornea. In some cases, the base of the pterygium is towards the temporal angle, and occasionally both sides of the eye are affected with this disease.

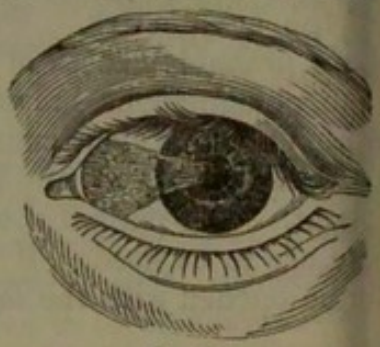

Fig. 31.

Although pterygium, in most cases, affects the conjunctiva only, we sometimes observe a part of it evidently seated beneath that membrane. This deep-seated portion presents a glistening, and almost tendinous appearance, especially towards the apex of the triangle, and probably belongs to the sclerotica or to the albuginea.

The form generally assumed by a pterygium is accurately represented in *Fig.* 31, but occasionally the upper and lower edges of the thickened part are not straight, but run in a curved form towards the sinuses of the conjunctiva; and although the apex is, in general, narrow, yet we sometimes see the disease advance over the edge of the cornea, with a broad rather than a pointed extremity.

One variety of pterygium is semi-transparent, and thinly strewed

with blood-vessels. This is the *pterygium tenue.* Another variety represents, from the size and course of its blood-vessels, almost the appearance of a thin muscle. This is the *pterygium crassum.* We can lay hold of each of these varieties with a pair of forceps, without much difficulty, and without giving the patient any pain, and raise it, not merely from the sclerotica, but even from the cornea. We can do this with greater ease, when the patient turns his eye towards the side whence the pterygium originates.

Pterygium sometimes proceeds even to its complete development without giving any pain, and even almost without any disagreeable feeling in the eye, so that the patient perhaps receives the first intimation of his disease from some other person, or from examining his eyes in a glass, or from the disease gaining that part of the cornea which is opposite to the pupil, and thereby obstructing vision.

The great number of pterygia which have their base turned towards the nasal angle of the eye, in comparison of the few which arise from any other part of the circumference of the eyeball, might naturally lead us to suspect that this disease consisted in an elongation of the semilunar fold of the conjunctiva, or that it took its origin from the caruncula lacrymalis; and on carefully examining a pterygium on the nasal side of the eye, it will appear evident, that the membrana semilunaris is generally involved in the disease. We have, however, the occasional occurrence of pterygium on the temporal, and even on the superior and inferior sides of the eye; whence it is evident that this disease is not always a prolongation of the semilunar membrane.

Pterygium on both sides of the same eye had occurred only twice to Beer. In these cases, they met in the centre of the cornea, and almost entirely deprived the patients of sight. In one case, Beer found three pterygia on the same eye. Mr Wardrop mentions having seen two pterygia on each eye of the same individual.

Schmidt gives[2] an account and figure of an extraordinary pterygium, which so strongly resembled a muscle in its structure, that one might have almost believed the rectus superior oculi to have been misplaced. Taking its origin from behind the upper eyelid, it passed over the eyeball to the edge of the cornea, exactly in the form of a layer of muscular fibres. At the edge of the cornea, it became thicker and almost tendinous, and, opposite to the pupil, interwove itself with the cornea in the same manner as the straight muscles do with the sclerotica. This pterygium was successfully removed by operation.

Mr Travers has represented[3] two cases of pterygium, each of which occupied the upper part of the eye. One of them was membranous and transparent, the other fleshy. The subject of the latter was a female, about 21 years of age, who had experienced repeated attacks of scrofulous ophthalmia, in one of which the cornea gave way, and the iris prolapsed near its ciliary margin. A pterygium then formed, originating from beneath the whole base of the upper eyelid; it was triangular, extended to the lower margin

of the cornea, was of sarcomatous density, about a line thick, and formed a fold when the eye was directed upwards. It was completely cured by the operation of dividing and detaching it at its basis. The patient recovered her sight, and ultimately no vestige of the disease remained.

Such sarcomatous pterygia as those mentioned by Schmidt and Travers bear some resemblance to symblepharon, and the latter disease has sometimes been operated on, as if it had been a mere pterygium. The history of the disease, however, as well as the appearances of the eye, will readily enable the surgeon to discriminate between these two diseases. In symblepharon, a probe may often be passed behind the thickened fold of conjunctiva, never in pterygium.

Causes. Beer scouts the idea adopted by many writers, that pterygium ought to be regarded as a consequence of ophthalmia. He grants that tedious or neglected ophthalmia, or ophthalmia treated with many relaxing external applications, is apt to leave the conjunctiva of the eyeball so loose, that on every motion of the eye, it falls into a number of folds, but asserts that such cases never appear to terminate in pterygium.

I have met with several cases, in which pterygium was combined with chronic catarrhal ophthalmia, and I am led to believe that the former disease had originated in the latter. I have also seen pterygium produced by scrofulous ophthalmia. In one case, I found a pterygium on the nasal side of each eye, in a person labouring under elephantiasis, who had been long in the West Indies. I have seen a particle of gunpowder, which had been lodged for years under the conjunctiva, at last cause pterygium. In many cases, it is impossible to trace this disease to any exciting cause. Of this, however, I am certain, that often the disease begins by the formation of what ultimately forms its apex, close to the edge of the cornea, before any thickening or unnatural vascularity of the conjunctiva is observable.

Beer[4] came to the conclusion, that pterygium most frequently owed its origin to the influence of lime or fine stone-dust upon the conjunctiva, by far the greater number of patients who had been under his care with this complaint, being day-labourers, who are extremely exposed to this cause. Mr Lawrence[5] has seen pterygium most frequently in persons who had lived long in hot climates.

Prognosis. Pterygium rarely disappears of itself, and the duration of the cure is exceedingly various, depending on whether the operation, which is the quickest and most certain means of cure, be immediately submitted to by the patient, and be performed without leaving any part of the pterygium behind, or whether we content ourselves with alternate scarifications and stimulating applications, till the pterygium disappear by a tedious process of organic change of substance. If the cornea has become partially opaque from the presence of a pterygium, it may be long of clearing, or may never clear.

Mr Raleigh relates[6] a case, in which a thick pterygium, occupying

he nasal side of the eye and encroaching about a line on the cornea, was entirely absorbed after the operation of extraction of the lens, he section being made on the temporal side of the cornea.

Treatment. I have found the solution of nitrate of silver useful n pterygium, even when the disease approached to the state styled *rassum*, especially when it was attended by catarrhal conjunctivitis. n several cases, I have known a cure effected by this means; as lso, by vinum opii.

Should these means fail, it will, in general, be sufficient, in cases f *pterygium tenue*, not yet reaching to the cornea, to lay hold of the terygium with a small pair of hooked forceps, and snip a bit of it way. After this, it shrinks and disappears. In the meantime, the art may be touched daily with the vinous tincture of opium, or he red precipitate salve.

With regard to *pterygium crassum*, the best plan is to remove it ompletely by operation. If the patient refuses to submit to this, ve may try the effect of dividing the pterygium by two or three ertical scarifications, and then touching it daily with vinum opii. The probability, however, is, that the patient will tire of a mode of ure so tedious; and there is also a danger, that the pterygium, instead of disappearing, may become more luxuriant and extensive.

Mr Wardrop describes, under the name of *fleshy pterygium*, what ppears by his account to have been a common triangular pterygium, mproperly treated by repeated scarifications, which, instead of ausing its diminution, made it grow more rapidly, till at last it projected from between the eyelids, and involved the semilunar membrane and caruncula lacrymalis.

If the patient submits to the extirpation of the pterygium, it is to e performed in the following manner. The patient being laid on is back on a table, the assistant takes charge of both eyelids, separating them so as fully to expose the eyeball. The patient is to ook outwards or inwards, according as the pterygium is on the nasal or temporal side of the eye, so as to put it on the stretch. With the hooked forceps, the operator seizes the pterygium about ts middle, raises it from the sclerotica and cornea, and then snips ff the fold thus formed with a pair of curved scissors. Any remains f the pterygium are now to be laid hold of, and removed in the ame way. On the following day, the whole surface of the wound s found in a state of superficial inflammation and suppuration. Cicatrization quickly follows, and the cure is generally completed in welve or fourteen days.

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[1] From πτερὸν, *wing*. *Web* of old English surgeons. *Flügelfell* of the Germans.

[2] Ophthalmologische Bibliothek von Himly and Schmidt; Vol. ii. p. 57; ena, 1803.

[3] Synopsis of the Diseases of the Eye; Pl. vi. fig. 3 and 4. p. 424; London, 820.

[4] Lehre von den Augenkrankheiten; Vol. ii. p. 638; Wien, 1817.

[5] Treatise on the Diseases of the Eye; p. 365; London 1833.

[6] Transactions of the Medical and Physical Society of Calcutta; Vol. iv. p. 57; Calcutta, 1829.

SECTION VIII.—PINGUECULA.

The little tumour called *pinguecula*, and sometimes *pterygium pingue*, appears to have its seat partly in the conjunctiva of the eyeball, partly in the cellular membrane connecting the conjunctiva to the sclerotica. It presents in the greater number of cases, a small, yellowish, well-defined elevation, situated close to the edge of the cornea, over which it very rarely advances, and never to such a degree as to interfere with vision. It is sometimes situated on the temporal, sometimes on the nasal, side of the eye. Weller assures us, that this little tubercle contains no fat. It seldom gives rise to any inconvenience. If it does, it is to be laid hold of with the hooked forceps, and removed with the scissors.

SECTION IX.—WARTS OF THE CONJUNCTIVA.

Warts, red, fleshy, and somewhat granulated, single, or in clusters, are met with, growing from every part of the conjunctiva, not excepting the surface of the cornea. Mr Travers compares them to the warts which arise from the inside of the prepuce, and attributes their origin to a similar cause, namely, irritation from a diseased secretion. We generally find that they are attended by puro-mucous inflammation of the conjunctiva.

I once saw a case, in which the removal of a small wart from the external surface of the lower eyelid, was followed by a crop of warts on the conjunctiva of the eyeball. They disappeared spontaneously, but left partial symblepharon of both upper and lower eyelid. In another case I saw a wart, growing by a narrow neck from the conjunctiva scleroticæ, so large as to cover the eyeball, and presenting an appearance which might readily have been mistaken for fungus hæmatodes of the eye. By pressing the tumour aside, the sound cornea was brought into view, and on careful examination the root of the wart was found to be exterior to the sclerotica, and moveable on the eyeball. Conjunctival warts must not be confounded with the fungus which grows round a foreign body lodged in the conjunctival folds.

Mr Wardrop has described a congenital warty excrescence of the corneal conjunctiva. He mentions that it was firm and immovable, with a rough granulated appearance externally, and from its brownish colour, did not appear very vascular. It was small when first observed, and increased in size in proportion with the other parts of the body.[1]

Although the progress of these excrescences is slow, they cause considerable irritation and inflammation, sometimes extending to the cornea, and ought therefore to be immediately removed with the

cissors. Escharotics appear to have scarcely any power in diminishing their bulk, although they may perhaps delay their progress.

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[1] Morbid Anatomy of the Human Eye; Vol. i. p. 32; London, 1819. Two cases of a similar kind are figured by Mr Wardrop; Vol. i. Pl. 4. fig. 1 and 2.

SECTION X.—POLYPUS OF THE CONJUNCTIVA.

Mr Lawrence tells us,[1] that he has seen small polypi, analogous to those of the Schneiderian membrane, growing from the conjunctiva. In one case, the tumour was as large as a pea, and was connected to the inner surface of the upper eyelid, by a slender stalk. It had a smooth mucous surface. In snipping it off, Mr L. found the peduncle hard, so as to require some force in dividing it. The tumour was found to be fibro-cartilaginous and hard internally, while externally it was formed of conjunctiva. The complaint had existed for 15 years, and had caused trichiasis of one quarter of the upper eyelid.

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[1] Treatise on the Diseases of the Eye; p. 366; London, 1835.

SECTION XI.—FUNGUS OF THE CONJUNCTIVA.[1]

The conjunctiva is subject to two different fungous diseases, both of them attended with inflammation, but neither of them a sequela of the specific diseases to which we appropriate the name of ophthalmiæ. The one has been described and figured by Beer, under the name of *exophthalmia fungosa*.[2] Mr Allan, in the third volume of his Surgery, has also described and figured the first variety.[3] The other fungous state of the conjunctiva I have not found described by any author. Both are rare diseases.

Symptoms. The *first* variety of fungus of the conjunctiva is of a deep red colour, inclining to livid; it affects chiefly the conjunctiva covering the sclerotica, over which it is elevated in irregular soft smooth masses; it sometimes rises from the inside of the lids, but never from the surface of the cornea. The fungus is pressed, however, by the eyelids, over the edge of the cornea, and sometimes to such a degree, as to hide it completely. Unattended by pain, this disease goes on increasing, till it projects from between the lids, and prevents them from closing. If neglected, it may reach to a great size, and is liable to be confounded with the last stage of spongoid tumour of the eyeball. By exposure to the influence of

the air, the secretion from the surface of the fungus becomes encrusted, while the irritation of the foreign substances which come into contact with it, renders it tender and apt to bleed. For a time, the firmness of the cornea and sclerotica is sufficient to resist the effects of the pressure of the fungous mass by which they are surrounded, and which makes way for itself chiefly by projecting and dilating the eyelids; but at length the eyeball begins to suffer from the pressure, inflames, bursts, and is destroyed.

The *second* variety of fungus of the conjunctiva, is almost of gelatinous consistence, and of a light yellow or brownish colour; it is met with chiefly on the inside of the lids, especially of the upper, and in the superior fold of the conjunctiva. It sometimes attains a very considerable size, and although soft, and destitute of red vessels, is apt to prove destructive, by the pressure which it exercises on the eyeball.

On the supposition of neither of these fungous affections of the conjunctiva being malignant, it is evident, that, by their mere mechanical effects, they may prove destructive not only of vision but of life. Even after the eyeball has been destroyed by their pressure, they may go on to increase, affect the bones of the orbit, and wear out the patient by pain and fever. I have sometimes been led to doubt whether the second variety was not carcinomatous, or of the nature of fungus hæmatodes.[4] Carcinoma undoubtedly commences occasionally in the conjunctiva; the membrane becoming swoln and warty, the eyelid thickening and inflaming, and the parts at length ulcerating.

Treatment. In the early stage of the fungous diseases of the conjunctiva above described, leeches to the conjunctiva would probably be useful; and benefit might perhaps be derived from the application of the vinous tincture of opium, or of gentle astringents in solution. At a later period, escharotics are naturally thought of, especially the solid nitras argenti. Should the disease still advance, extirpation of the fungus ought not to be delayed; and in both varieties, it will be found of much advantage to commence the operation by separating the eyelids at their temporal angle, by an incision carried towards the temple, so as to allow the whole of the diseased conjunctiva to be exposed to view. The extirpation will now be accomplished with comparative ease, by means of the hooked forceps and a small scalpel, with the occasional aid of the scissors. The first variety of fungus, when we attempt to dissect it from the sclerotica, bleeds profusely, so that the assistant must be prepared to clear away the blood as the operator proceeds, by injecting cold water over the eye. After the whole of the fungus is removed, the eyelids, where they have been disunited, are to be brought together with a stitch. The surface exposed by the removal of the disease, will in a day or two be covered with purulent matter, and slowly become invested by a pseudo-conjunctiva. Any tendency to reproduction must be prevented by the use of nitras argenti, and symblepharon guarded against by frequent motion of the eye,

and the introduction of a little mild salve into the folds of the conjunctiva.

When fungus of the conjunctiva has been allowed to proceed in its course till the eyeball is destroyed by its pressure, it will be difficult to remove the fungus growth by itself, and it is quite unnecessary to attempt to do so. In such cases, we must have recourse to extirpation of the eyeball, taking care also to remove any part of the fungus arising from the inside of the eyelids.

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[1] *Sarcosis bulbi.* *Schwammichte Exophthalmie* of the Germans.

[2] Lehre von den Augenkrankheiten; Vol. ii. pp. 223, xxx.; Pl. ii. fig. 6.; Wien, 1817.

[3] See two cases by Scarpa, in his Trattato delle principali Malattie degli Occhi; Vol. ii. p. 303; Pavia, 1816.

[4] Canstatt über Markschwamm des Auges und amaurotisches Katzenauge; p. 11; Würzburg, 1831.

SECTION XII.—CONJUNCTIVAL AND SUBCONJUNCTIVAL TUMOURS.

Various tumours take their origin in the conjunctiva, or in the cellular membrane which connects it to the neighbouring parts. Some of them are congenital, others arise in after-life.

1. The annexed figure represents a case described[1] by Professor Gräfe, under the name of *trichosis bulbi*. I once extirpated a tumour of the same appearance, and exactly in the same situation. It was firm, and white, and had a number of fine hairs growing from it. It had long kept up an inflamed state of the conjunctiva, which entirely subsided after the tumour was removed. It was so incorporated with the sclerotica, that its root was left, but died away under the use of nitrate of silver solution.

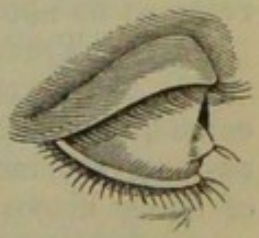

Fig. 32.

Mr Wardrop has described and figured a tumour, about the bulk of a horse-bean, of which a small part seemed to grow from the cornea, while the rest was situated on the sclerotica, next the temporal angle of the eye. Its surface was smooth, and covered by the conjunctiva. Upwards of twelve very long and strong hairs grew from its middle, passed through between the eyelids, and hung over the cheek. The patient, at this time upwards of 50 years old, remarked that these hairs did not appear until he had advanced to his sixteenth year, at which time also his beard grew.[2]

2. We sometimes meet with small, very hard, vesicular tumours, attached to the conjunctiva. They are to be snipped off.

3. Other conjunctival or subconjunctival tumours are adipose, sarcomatous, or even cartilaginous, and in most cases, are easily

extirpated, for, in general, they are but loosely attached to the sclerotica.

4. I have seen several cases of what seemed scrofulous tubercles, growing from the sclerotica, and elevating the conjunctiva. Such tumours are of a whitish or yellowish colour; they appear as if about to suppurate, but continue firm, slowly increase to perhaps the size of a hazel-nut, burst through the conjunctiva, but do not come to suppuration. In one case, a child presented a tubercle imbedded in the cheek, similar to the one growing from the eye. Both resembled a good deal the disease I have described (page 154) as albuminous tumour of the eyelids.[3] They are probably similar growths, which, contained within the eye, constitute what I shall describe in a subsequent chapter as non-malignant tumours. Such cases, left to themselves, are apt to end in disorganization and atrophy of the eyeball. If extirpation is attempted, the diseased mass is found to be soft and easily torn.

5. Mr Abernethy refers[4] to a curious case, published in London, by Dr Bouttatz, of Moscow, of a tumour which grew beneath the conjunctiva, and pushed it out from between the eyelids. It was seven inches long, and three inches and a half in circumference; and, on extirpation, weighed two pounds and a half. The structure, Mr Abernethy considers to have answered correctly to what he has denominated pancreatic sarcoma. It had also the ordinary characters of that diseased structure, which are those of slowly and regularly increasing, not being prone to inflammation, nor tending to suppuration. The tumour was closely connected with the conjunctiva, against which it pressed, but did not involve the cornea, which still retained its natural transparency.

6. Mr Travers has given an account of the case of a lady, in whom the cornea was concealed by a tumour, of a dark purple colour, protruding to such an extent between the eyelids, as to occasion great inconvenience and deformity. It had the appearance of being disposed in lobes, somewhat resembling a bunch of currants of unequal size. Mr Travers extirpated, in this case, the anterior hemisphere of the eyeball. On examination of the tumour, the cornea and sclerotica proved to be entire, and the morbid growth, lying upon and adhering to the cornea and a small portion of the sclerotica, had acquired the lobulated appearance, as if by degeneration of the investing conjunctiva. Delicate white bands, the only vestiges of this membrane, were seen intersecting the lobules at irregular distances, in the form of septa. The substance, on dissection, was found to be partly firm, partly pulpy, of a dark colour, here and there mottled with white, and measured a quarter of an inch in thickness from the external surface of the cornea.[5]

Had Mr Travers been aware of the external seat of this tumour, perhaps he might have endeavoured to extirpate it without sacrificing any part of the eyeball. In the explanation of the two figures which he has given of the tumour, he tells us that when he first saw

the case, he formed the idea that it was a fungus originating from the iris or choroid, consequent to a slough of the cornea. The patient recovered quickly from the operation, and the remaining part of the eyeball collapsed. From the dark colour and partly pulpy consistence of the morbid growth, may we not suspect it to have been of the nature of melanosis? Mr Travers mentions that the surface of the cornea was rough, and had a brownish tint, as if beginning to degenerate into the morbid mass which lay above it.

The figure which Mr Travers has given of the external appearance of the tumour, is very similar to the eye of a gentleman by whom I was consulted some years ago, and who submitted by my advice to have the anterior half of the eyeball extirpated, as in Mr Travers' case. Dr Monteath being consulted, approved of and performed the proposed operation; but on examining the portion of the eye which was removed, we found the melanotic degeneration to occupy the whole place of the vitreous humour, so that the rest of the eye was immediately extirpated. The case did well, and I have heard of no return of the disease.

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[1] Journal der Chirurgie und Augenheilkunde; Vol. iv. p. 137; Berlin, 1822. See Ruppius, in Ammon's Zeitschrift für die Ophthalmologie; Vol. ii. p. 345; Dresden, 1831.

[2] Morbid Anatomy of the Human Eye; Vol. i. p. 32; London, 1819.

[3] I am inclined to suspect that the species of molluscum described by Bateman as communicable by contact, is the same disease as what I have called albuminous tumour. See his Practical Synopsis of Cutaneous Diseases, p. 274; London, 1819.

[4] Surgical Observations on Tumours, &c. p. 43; London, 1811. Bouttatz, Observations pratiques sur differentes Maladies; p. 1; Londres, 1801. Burgmann and Blumenbach have each described a case of extraordinary *prolapsus conjunctivæ*, observed by the former in the head of a man who was hanged, and by the latter in that of a man who was beheaded. Some analogy has been supposed to exist between Bouttatz's case and the prolapsus conjunctivæ in these two instances. See Ammon's Zeitschrift für die Ophthalmologie; Vol. i. p. 111; Dresden, 1831.

[5] Synopsis of the Diseases of the Eye, pp. 102. 394; London, 1820.

CHAPTER V.

DISEASES OF THE SEMILUNAR MEMBRANE, AND CARUNCULA LACRYMALIS.

SECTION I.—INFLAMMATION OF THE SEMILUNAR MEMBRANE AND CARUNCULA LACRYMALIS.

Symptoms. The semilunar membrane and caruncula lacrymalis, when inflamed, become much enlarged, of a bright red colour, and affected with considerable pain, especially when the lids are moved. The inflammation extends in some degree to the conjunctiva, of which, indeed, the semilunar membrane is a portion, and by which the caruncula is invested. A sensation as if some foreign body was lodged in the inner angle of the eye attends the disease, the absorption of the tears is obstructed, and an increased secretion of mucus, sometimes puriform, flows from the Meibomian follicles, conjunctiva, and caruncula. In some cases, suppuration takes place in the substance, perhaps in the follicles, of the caruncula, the redness and swelling increasing for a time, till matter forms, when the swelling points, breaks, and discharges itself. Fungous excrescences are apt to follow, and sometimes a permanent distortion of the caruncula; while in other instances, this part is entirely destroyed by the suppuration.

Causes. The influence of cold is the most frequent cause of the inflammation. I had a very distinct instance of this in a patient who caught cold while recovering from dysentery. Slight injuries may also induce this disease. Foreign bodies lodging behind the semilunar membrane, or so fixed as to irritate the caruncula, may also be the cause. Dr Monteath mentions[1] his having seen this disease in two instances, produced by a loose eyelash, the root or thick end of which had fairly entered the upper punctum and lacrymal canal. Its other extremity consequently pointed downwards to the caruncula, which it constantly irritated. The troublesome irritation which had been excited in both instances, immediately subsided on removing the eyelash from the lacrymal canal. This little accident I have met with in a number of instances; in some of which, the eyelash was in the lower punctum, and in others in the upper. In one case, the patient, with the view of relieving the uneasiness which he felt, had made the eyelash be cut across with a pair of scissors, which only served to fret the caruncle the more.

Prognosis. Inflammation of the semilunar membrane, and ca-

runcula lacrymalis, if neglected, may give rise to watery eye, and ultimately to inflammation of the lacrymal passages.

Treatment. The removal of the cause, when that is known and removable; bathing the parts frequently with tepid water; touching them once a-day with the lunar caustic solution; and the use of laxatives, make up the general treatment. Should the swelling go on increasing, a leech may with propriety be applied to the inflamed caruncula; and if suppuration threatens, a bread and water poultice, in a thin linen bag, is to be laid over the inner angle of the eye. The suppurated caruncula is to be opened with the lancet. Should it threaten to throw out fungous granulations, we must endeavour to repress them by the vinous tincture of opium, or the application of sulphas cupri, or nitras argenti. If these means are insufficient, the fungus must be removed with the scissors.

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[1] Translation of Weller's Manual; Vol. i. p. 191; Glasgow, 1821.

SECTION II.—POLYPUS OF THE CARUNCULA LACRYMALIS.

I have seen a soft red tumour growing by a pedicle from the caruncula, bleeding profusely on being touched. On laying hold of it, the greater part of it came away in the grasp of the forceps, and looked exactly like the soft polypus of the Schneiderian membrane. The root was touched with nitrate of silver.

SECTION III.—ENCANTHIS.

This term is applied to a chronic enlargement of the caruncula lacrymalis and semilunar membrane, but especially of the former. Encanthis *benigna* has been distinguished from encanthis *maligna*; the former a mere fungous state of the parts, and probably of the conjunctiva more than of the caruncula, the effect of simple inflammation, and disappearing under the use of the remedies already enumerated; the latter a scirrhous affection of the glandular substance of the caruncula, degenerating, if neglected, into cancerous ulceration.

Symptoms. In scirrhous encanthis, the caruncula presents the appearance of a hard, irregular swelling. It involves the semilunar fold, and extends to the conjunctiva lining the lids. It is at first of a uniform red colour, but after it has attained a considerable

bulk beyond the natural size of the caruncula, it becomes here and there of a whitish colour, with varicose vessels ramifying over its surface. It is the seat of lancinating pain. It impedes, by its size, the functions of the eyelids and excreting lacrymal passages. The hairs growing from it become much stronger than natural. Its surface is easily excited to bleed. At last it ulcerates, the edges of the sore become everted, and the discharge is thin and acrid, irritating and excoriating the neighbouring parts. If allowed still to proceed in its course, the cancerous ulceration spreads to the lids, lays open the lacrymal passages, attacks even the eyeball, and in fact runs a course similar to that of cancer of the lids, as already described.

Treatment. The scirrhous encanthis requires to be extirpated. For this purpose a curved needle, armed with a linen thread, is to be passed through the tumour, by means of which it may be drawn out from the neighbouring parts, while, with a small scalpel or the scissors, it is completely separated from its connexions. It is probable, that the removal of the caruncula and semilunar fold, will be followed by incurable stillicidium lacrymarum, but even if this should happen, it is not to be compared with the dangers attending a scirrhous, or cancerous affection of these parts, left to itself.

CHAPTER VI.

DISEASES OF THE EXCRETING LACRYMAL ORGANS.

SECTION I.—INJURIES OF THE EXCRETING LACRYMAL ORGANS.

§ 1. *Injuries of the Lacrymal Canals.*

The intrusion of loose eyelashes into the puncta, has been mentioned in the 1st Section of Chapter V.

If the canals which lead from the puncta lacrymalia to the lacrymal sac are injured, it becomes a question, how far the eyelids are likely to be distorted, and the integrity of the canals destroyed, by the cicatrice which follows, or the suppurative inflammation which is to be dreaded. When the wound has been occasioned by a clean cutting instrument, we may hope for a cure, without either distortion of the eyelids or permanent interruption of the function of the canals. When the part is torn or bruised, it

may be destroyed by the consequent inflammation and suppuration; and if both canals are included in the injury, an irremediable stillicidium, or discharge of tears and mucus from the nasal angle of the eye, seems likely to ensue.

In lacerated wounds, then, our prognosis must be doubtful. Yet even such wounds are sometimes happily cured. Schmidt relates[1] the case of a person who in a game at blindman's buff, was laid hold of, by the finger of one of the party, exactly in the nasal angle of the eye, and had the under eyelid torn away to the length of half an inch from the upper. Mohrenheim, who happened to be in the company, pronounced an unfavourable prognosis; but by Schmidt's care the case was cured in eight days, without the slightest stillicidium or ectropium. He omits, however, to mention whether he sounded the lower canal with Anel's probe after the cure, so as to ascertain that it was patent. In a drunken brawl, a man met with an injury exactly similar to what Schmidt describes, and for which he applied at the Glasgow Eye Infirmary. It healed after a good deal of trouble in keeping the lid in its place, left very little deformity, and no stillicidium. I thought it very unlikely, from the nature and situation of the injury, that the lower canal could have continued patent, and on passing Anel's probe, I found it totally closed about the middle of its course. In Case 119 (page 141), both canals were totally removed in an operation for cancer, and yet no stillicidium ensued. Either little lacrymal secretion is formed in such cases, or the conjunctiva absorbs more of it than it does in general, or it is more readily dissolved in the air. The observations of Gunz and Zinn, indeed, would lead us to suppose, that, besides the two canals, there are other smaller channels from the conjunctiva into the lacrymal sac.[2]

In cases of wounds of the canals, our object is to bring the separated parts into apposition, and then to keep them so. This is best effected by the introduction of a stitch, and the application of slips of plaister supported by a compress and roller. The patient must be careful to keep the eyes at rest, till the wound is perfectly united. It might perhaps aid us in procuring a perfect union, to pass a bristle by the punctum, and through the divided canal, and keep it there till the wound heals.

If the wounded canal does not unite, but each end cicatrizes separately, little is to be hoped from making raw the edges of the wound, and again trying to bring them together with greater accuracy. "I have met with several such cases," says Mr Travers, "and have tried in vain to heal them."[3]

I saw a boy at the Glasgow Eye Infirmary, in whom a wound, received eight years before, had divided each lacrymal canal, about one fifth of an inch from the puncta. The openings, thus produced, nearest to the puncta, remained, while those next the lacrymal sac had completely closed. A troublesome stillicidium lacrymarum was the result. There was an anchyloblepharon, also, at the inner angle of the eye.

§ 2. *Injuries of the Lacrymal Sac.*

The lacrymal sac is pretty well protected from injury. It is occasionally, however, laid open both by incised and lacerated wounds. These must be treated with care, lest they degenerate into fistulæ. Schmidt mentions[4] a case in which a penetrating wound of the sac ended in this way. If the wound is extensive, and perhaps the tendon of the orbicularis divided, a stitch or two will be necessary. Should the opening into the sac contract to a small size, and its edges threaten to become callous, they should be touched with lunar caustic, or a red hot wire.

A blow over the sac will sometimes rupture it, without the skin being divided, and emphysema of the eyelids will ensue, on blowing the nose.

Lacerated and gunshot wounds, implicating the sac, are followed by great swelling of the eyelids, and are apt to end in sloughing. Care must be taken to obviate ectropium in such cases.

§ 3. *Injuries of the Nasal Duct.*

The duct itself is completely secured from all immediate injury; but the osseous canal, through which it passes, is sometimes shattered, and its sides pressed in by severe blows on the face. I once saw this follow a kick from a horse, received on the side of the nose. The consequence was complete obliteration of the passage for the tears from the lacrymal sac. The lacrymal canals and the sac, being uninjured, served to collect the tears, which, having no exit, caused frequent inflammations of the sac, which ended in abscesses, bursting through the skin. The patient was admitted into the Glasgow Eye Infirmary, under the care of the late Dr Monteath, who, as he found it impossible to effect any new passage for the tears, not even through the os unguis, attempted by caustics of various kinds, and even by the actual cautery, to obliterate the sac and canaliculi, but without success. Under such circumstances, by cutting across the canaliculi, the tears might be prevented from reaching the sac.

Dr Rognetta suggests that in every case of fracture of the nose, in which there is reason to dread closure of the nasal duct, we should sound the duct from the inferior aperture, with the probe of Laforest, improved by Gensoul, and leave it in the duct for at least a day.[5]

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[1] Ueber die Krankheiten des Thränenorgans, p. 215; Wein, 1803.
[2] Zinn, Descriptio Anatomica Oculi Humani, p. 233; Gœttingæ, 1780.
[3] Synopsis of the Diseases of the Eye, p. 238; London, 1820.
[4] Op. Cit. p. 348.
[5] Cours public d'Ophthalmologie; Lancette Française, 3 Dec. 1836.

SECTION II.—ACUTE INFLAMMATION OF THE EXCRETING LACRYMAL ORGANS.[1]

Symptoms. There is a circumscribed swelling in the situation of the lacrymal sac, hard, very sensible to the touch, and accompanied by a feeling of obtuse, deep-seated pain, extending to the nose and to the eye. This swelling gradually becomes red, and the least touch is insupportable. The papillæ are shrunk, the puncta scarcely visible, the absorption and conveyance of the tears into the lacrymal sac, and through the nasal duct into the nose, completely stopped, and a stillicidium lacrymarum is present. The nostril on the affected side is at first uncommonly moist; but it soon becomes dry, the inflammation extending to the mucous membrane of the nostril. A degree of sympathetic inflammation affects the caruncula lacrymalis, the conjunctiva, and the eyelids. The redness about the nasal angle of the eye, extending with some degree of swelling even to the cheek, gives to the parts when viewed at a distance an appearance as if the integuments were attacked by erysipelas; but on a nearer examination, the characteristics of phlegmonous inflammation are recognised, and in the midst of the diffused discoloration and tumefaction, the circumscribed swelling of the lacrymal sac is evident, not merely to the touch, but even to the view.

The primary and chief seat of this disease is the mucous membrane of the whole of the lacrymal passages, from the puncta to the nose. When the stage of pure inflammation has reached its highest degree, and is about to pass into the suppurative stage, the mucous membrane of the lacrymal canals and nasal duct becomes so much swoln, that these tubes cease to be pervious. The tumefaction extends also to the parietes of the sac. The nasal duct, being enclosed in an osseous canal, cannot become tumefied by inflammation, and at the same time leave a free passage to the tears. The interior side of the sac, on the other hand, being covered only by soft parts, is gradually distended, so as to form the tumour already mentioned, which becomes much more considerable when the disease is so far advanced that the mucus secreted is of an inordinate quantity and puriform. The pressure from within the sac produces progressive absorption, so that the matter comes gradually towards the surface, while the thickening of the mucous membrane behind serves to secure the deeper-seated parts. Mr Hunter has repeatedly referred[2] to the fact of the matter within the sac not following the shortest way, which would be directly into the nose, but coming to the external surface, as an illustration of the instinctive provision which exists in the body for bringing extraneous and morbid substances to the skin for their exit. Occasionally, however, the means of protection becomes a cause of future evil, for there sometimes takes place such a change in the texture of the parietes of the canals, sac, and duct, that they can scarcely ever return to their

natural state; but one or more of these parts are, in a greater or less extent, constricted, or even obliterated.

Towards the end of the inflammatory stage, the patient complains of headach, and presents the other symptoms of febrile disturbance of the constitution. The pain in the parts primarily affected is often very severe, in consequence, no doubt, of the unyielding nature of the surrounding structures. The whole head suffers, and the fever is not unfrequently attended with delirium during the night.

As happens with all mucous membranes in a state of inflammation, a very abundant morbid secretion of mucus takes place at the transition of the first into the second stage. This fluid collects in such a quantity within the lacrymal sac, that the tumour is strikingly increased in size, and is felt distinctly to fluctuate. The accumulated mucus cannot escape in any considerable quantity from the sac into the nose, on account of the stricture arising from the swoln state of the lining membrane of the nasal duct, or it may be on account of its actual obliteration. From the same cause, the accumulated mucus cannot be regurgitated through the lacrymal canals. Besides, though the tears are more plentifully secreted than during health, they are not absorbed and conveyed into the sac, where they might have the effect of diluting this morbid mucous secretion.

It rarely happens, after the sac is once filled with muco-purulent fluid, that the symptoms begin to subside, without the skin giving way. If they do, a discharge, of matter takes place from the puncta, the swelling falls, and the passage into the nose becomes patent. In general, the tumour increases, the redness becomes darker, the skin more glistening, the fluctuation more distinct. The sac and the parts by which it is covered, altered by inflammation, are incapable of any further distention. The skin sometimes mortifies and sloughs; but more commonly in the middle of the swelling, a yellowish, soft point is observed, generally below the tendon of the orbicularis, but in some rare cases above it, and which soon gives way. The collection of puriform mucus, left to itself, works a passage through the orbicularis palpebrarum, and through the integuments; but by this opening, the thinner parts merely of the puriform secretion will be discharged, and the tumour will, at least for some time, be but inconsiderably diminished.

By and by, we observe, when we press upon the superior part of the sac, that it is not altogether puriform mucus which is discharged by the opening, but occasionally a quantity of pure tears, a proof that the action of the puncta and canaliculi is re-established. After a time, the puriform discharge ceases, and healthy mucus comes to be secreted. It is in general transparent, although for a while it may present occasional streaks of a white colour. These at last entirely disappear, and the mucus becomes thinner in consequence of a due intermixture of tears. The opening of the sac now heals either spontaneously or by the assistance of art. Most frequently

it begins with contracting to a small aperture, by which, if the nasal duct has not returned to its natural dilatation, tears and mucus are discharged. Should this opening close, and the duct still continue impervious, the patient is obliged several times in the day to press upon the sac, that the mucus and tears which it contains may be discharged through the lacrymal canals.

Causes. Among the causes of this disease, exposure to cold, and contusions on the side of the nose, are those most frequently noticed by patients. I have known long-continued weeping bring on acute dacryocystitis, when there appeared no predisposition to the disease. Beer mentions the case of a child of four years old, in whom it arose from the irritation of a large pea which had been thrust so deep into one of the nostrils that it was with difficulty extracted.[3]

Prognosis. In every instance, this is a sudden and rapid disease, terminating its course in 10 or 12 days. The prognosis is always more favourable than in the chronic affection of the same sort, which has probably been long preceded by imperfect transmission of the tears into the nose.

When this disease arises from no considerable injury of the sac, but from some slight, perhaps unknown cause, the prognosis is very favourable during the first stage; that is, before the secretion of puriform mucus has commenced. If the disease has reached the suppurative stage, we have to contend indeed with a blenorrhœa, or morbid secretion and accumulation of mucus; but under proper treatment these symptoms may disappear. When the inflammation is from the beginning severe, or the case has been neglected or mistreated, the nasal duct and lacrymal canals run the risk of obliteration; and it is to be accounted fortunate if the duct is obliterated at its lower extremity only, or the canals merely at their termination in the sac. The whole length of the duct may be converted into a ligamentous, almost cartilaginous substance, which baffles every attempt again to render it pervious; and in this case, both the lacrymal canals and the sac itself may become obliterated. The possibility of such events must be borne in mind, when we are called in even during the first stage.

The prognosis during the second or suppurative stage is extremely dubious. No surgeon, however great his experience, can know how far during the first stage, the permeability of the canals has been affected; nor can he at this period attempt to ascertain by probes the state of the parts, without exposing them to essential injury. If we are called in just as the suppuration has commenced, our treatment may perhaps moderate that process; and, at least, we have it in our power to open the sac at the proper time and in the proper place. If we are later, we probably have a fistula to contend with.

Treatment. It is by combating the inflammation that we are to cure this disease, and not by attacking merely one, or even several of the symptoms. Dilatation, for instance, by the introduction of

probes through the canaliculi into the sac, and even into the nose, would only be subjecting the inflamed parts to a new cause of irritation, and might thus produce effects which would render a complete cure difficult, if not impossible.

The method of treatment before the process of suppuration has commenced, is sufficiently simple. In mild cases, it consists in observing the antiphlogistic regimen, and in carefully applying to the inflamed parts a piece of folded linen, moistened with an evaporating lotion. In severe cases, bleeding at the arm, immediately followed by the application of leeches over the swelling, or to the mucous membrane of the nostril, ought to be employed. The bowels are to be freely opened, and a gentle degree of perspiration maintained by the use of some of the common diaphoretics. Our object is to arrest the process of inflammation, and to prevent it from passing into suppuration. Where this is impossible, and the symptoms show that the process of suppuration has commenced, the cold lotion should give way to a warm emollient poultice.

Should our hopes of checking the disease be still disappointed, and the secretion of puriform mucus go on augmenting, the sac must be opened with the knife as soon as it is so overfilled, and the parts which cover it so far disorganized, that the middle of the tumour becomes soft and yellowish, pointing like an abscess. We make our incision in the direction of the longer diameter of the tumour, and as we withdraw the lancet, enlarge the opening downwards through the integuments, that the matter may have a free exit. We may now introduce a common silver probe into the sac, and direct it downwards into the nasal duct. We shall almost always find that it descends freely into the nostril. With tepid water and the lacrymal syringe, we next wash out the parts, and this is to be repeated daily. A common poultice is now to be applied, enclosed in a thin linen bag, and after the opening has continued for several days, and the matter has been freely evacuated, if the sac should continue hard, a warm poultice of cicuta leaves with camphor is recommended for discussing the induration. A mercurial plaister is also found useful for this purpose.

As soon as the object of these applications is gained, the wound is to be dressed with simple cerate. Under this treatment, the process of suppuration diminishes, and the matter discharged begins to lose more and more the character of pus, and to approach to that of mucus.

Should the unnatural secretion threaten to become habitual, a little of a weak solution of sulphate of zinc (gr. ii. to ℥i.) made lukewarm, is to be dropped, once or twice a-day, into the nasal angle of the eye, and injected through the wound into the sac.

At this period, if the treatment has been properly conducted, we most frequently find that the canaliculi and the nasal duct have of themselves become permeable, the secretion of mucus natural in quantity and quality, and mixed duly with the fluids absorbed from the lacus lacrymarum. We therefore cover the opening into the

sac with a bit of adhesive plaister, or apply such dressings to it as may induce it to close. If we have any doubt of the complete permeability of the lacrymal canals and nasal duct, we have recourse to that examination of the parts which I shall describe in the ninth and tenth sections of this chapter.

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[1] *Dacryocystitis acuta.*

[2] Hunter on the Blood, Inflammation, and Gun-shot Wounds; Vol. ii. pp. 298, 331; 8vo; London, 1802.

[3] Praktische Beobachtungen über Augenkrankheiten, p. 32; Wien, 1791.

SECTION III.—CHRONIC INFLAMMATION OF THE EXCRETING LACRYMAL ORGANS.[1]

This, which is by far the most common disease to which the excreting lacrymal organs are subject, occurs more frequently in women than in men. Occasionally we see it even in infants. It presents five different stages.

1*st Stage—Watery Eye.* The symptom which, in general, first attracts the patient's attention, is weakness of the eye, from the tears gathering at the inner canthus. Whenever he begins to read, or look earnestly at any minute object, he finds a tear ready to drop over on the cheek. Within doors, and in warm dry weather, he is less troubled with this stillicidium; it is much increased when he exposes himself to a cold moist atmosphere. To relieve himself of the inconvenience, he either simply applies his handkerchief to absorb the superabundant moisture, or puts his finger upon the sac, and forces its contents down into the nostril. He goes on, in this way, for perhaps months or years; but, by and by, he finds that the contents of the sac can no longer be made to descend into the nostril, but, on pressure, regurgitate through the puncta. This, however, still affords relief, and the patient probably persists in the practice for a great length of time.

This stage of the disease is, in general, attended with no pain; but on comparing the diseased side with the healthy one, we may always observe an additional degree of fulness at the inner canthus. The canaliculi, caruncle, and integuments are thickened, and somewhat inflamed, and the orbicularis palpebrarum and tensor tarsi are incapable of acting as in health.

2*d Stage—Blenorrhœa.* As the second stage approaches, the patient feels pain in the seat of the sac, attended with an additional degree of redness and swelling, at the inner canthus. On pressing the sac in his usual way, for the purpose of emptying it, he now observes that it is not pure tears, or a transparent mucus which is discharged, but an opaque fluid. If he becomes alarmed at this, and seeks advice, we find that whenever we press pretty strongly on

the sac, a quantity of puriform mucus wells out through the puncta, and overflows the eye. Rarely, however, can our pressure empty the contents of the sac through the nasal duct, as its permeability is for the most part suspended by general tumefaction of its mucous membrane, or by stricture at some particular point. Hence the patient almost always complains of dryness of the nostril, in this stage of the disease.

The extent of the blenorrhœal inflammation is various. The lining membrane of the sac is its chief seat. In many cases, we have reason to suspect that the whole excretory passages are affected; while in others, it is evident that one or other of the lacrymal canals only is the source of the discharge. I had under my care a lady in whom the upper lacrymal canal only seemed affected. The surgeon in the country, under whose care she had been, treated the case as one of inflammation of the conjunctiva; there was no lacrymal tumour; the matter, oozing from the upper punctum, inflamed the conjunctiva; and it was not till after repeated examinations, that I detected how limited was the seat of the disease.

The accumulated mucus, also, varies much both in quantity and quality. For instance, it accumulates more rapidly and is much thicker after taking food than at other times. The secretion of it is very plentiful, but thinner than usual, when the patient continues long in a moist and cold atmosphere. In this case, the overfilling of the sac sometimes takes place so rapidly that the compression of the orbicularis palpebrarum in the act of winking is sufficient to evacuate it through the canals to such a degree that the whole surface of the eyeball is suddenly overflowed, and the puriform fluid runs down upon the cheek. After the patient remains for a short time in a warm and dry atmosphere, the morbid secretion becomes sparing and ropy. We find that this blenorrhœa almost completely disappears in many individuals during warm weather, upon which the yet inexperienced patient is apt to express a premature joy, for on the very first change to cold and wet weather, the disease most frequently returns as before.

3*d Stage—Abscess.* It is evident, from what has been said, that the inflammation with which chronic dacryocystitis commences, is very seldom considerable. In scrofulous patients especially, the purely inflammatory stage is not unfrequently overlooked, and no advice asked till puro-mucus has considerably distended the sac. The external signs of inflammation in different cases of the disease, and even in the same case at different times are very various. Sometimes we find the integuments free from discoloration, and merely elevated by the distended sac. At other times, they are severely inflamed, exquisitely tender to the touch, thinned by the pressure of the puriform mucus, and ready to give way. In fact, the longer the disease has lasted, the more liable does the sac become to attacks of inflammation, which, though repeatedly dissipated, generally end at last in the sac pointing like an abscess, bursting, and discharging the puriform fluid which it contains. After this,

the opening in the skin may heal up, the disease return to the blenorrhœal stage, or even to that of mere watery eye; and for years the patient may in this way suffer from repeated abscesses of the sac, without submitting to any efficient mode of treatment. The stage of abscess is attended with hemicrania and fever.

4th Stage—Fistula. If, in the stage of abscess, the collection of puriform mucus be left to itself, it will form a passage through the fibrous membrane by which the sac is covered, the orbicularis palpebrarum, and the integuments. The opening thus formed may not close, but merely contract after the contents of the sac are evacuated, manifest no disposition to heal, and degenerate into a fistula of the sac. Through such an opening, a great portion of the mucus and tears taken up by the puncta are discharged, very little, or none, going down through the nasal duct. This is a sort of natural cure of the disease.

It rarely happens that the opening through the anterior part of the sac is directly opposite to that which has been wrought, by the process of suppuration, through the fibrous layer of the lower eyelid, the orbicularis palpebrarum, and the integuments; and it is sometimes the case, that though there be but one opening into the sac, the matter forms beneath the skin several sinuses, which open by small orifices at different places, more or less remote from one another. This complicated kind of fistula is most apt to occur in patients of bad constitution, and is generally the result of often-renewed attacks of inflammation during the course of this tedious disease.

5th Stage—Caries. In those patients who have suffered from frequent abscess of the sac, and in whom the external opening has degenerated into a fistula, we sometimes find on introducing a probe, for the purpose of ascertaining the state of the nasal duct, that it comes immediately into contact with bare rough bone, and that instead of passing with difficulty in the course of the nasal duct, it can be turned in various directions with little or no opposition, in consequence of the disorganized state, not merely of the soft parts, but of the bones by which these are naturally surrounded. The os unguis and inferior turbinated bone are particularly subject to this carious state, but it sometimes extends also to the ethmoid and superior maxillary.

There is reason to think that in such cases of carious fistula, not merely has inflammation spread from the lacrymal sac to the periosteum to which it is attached, but that the matter collected within the sac has drained through its posterior wall as well as perforated its anterior, and in this way induced the disorganization of the bones.

Carious fistula seldom if ever occurs, except in long neglected cases, or when the individual is affected with scrofula, syphilis, or some other constitutional disease.

Causes. The general cause of the train of symptoms above detailed, is undoubtedly inflammation of the mucous membrane of the

excreting lacrymal passages. This, at least in many instances, and at an early period, induces stricture of the nasal duct, an effect which in its turn operates powerfully in continuing the disease.

Congenital smallness of some part of the nasal duct is probably an occasional cause of chronic dacryocystitis. I operated on two twin sisters, at the ages of 44 and 45, in whom the disease was in all likelihood owing to a congenital tendency to stricture.

Chronic dacryocystitis is not unfrequently complicated either locally and constitutionally.

Locally, it may be connected with catarrhal inflammation of the Schneiderian membrane, or continued disorder of the Meibomian glands and conjunctiva; although certainly the doctrine of Scarpa, that the general cause of this disease is the absorption of puro-mucous fluid from the lids by the puncta, is incorrect.

It will, in many cases, be found, that chronic dacryocystitis is modified by some faulty state of the general health, and often by scrofula. There are other portions of the mucous system, the inflammation of which is strikingly modified by this latter cause. Mr. Hunter "suspected that there was something scrofulous in some gleets;"[2] and with gleet, or chronic, periodic, puro-mucous inflammation of the urethra, this affection of the lacrymal passages presents a striking analogy. Indeed it may be asserted in general, that the effect of scrofula upon any inflammatory disease, is to prolong its second stage, and to render it chronic. In other cases, chronic inflammation of the excreting lacrymal organs appears to depend upon the weakly constitution of the patient, although he be free from scrofula; and in others, it is evidently kept up, and in some it appears to be produced, by the disordered state of the digestive organs. Small-pox, measles, and scarlet fever, frequently call into action an occult scrofulous disposition, and at the same time give rise to the particular local disease which forms the subject of this section.

As occasional causes of the relapses which take place in the course of this disease, we may mention the influence of cold while the individual is perspiring, long-continued weeping, and much stooping.

Prognosis. It is, in general, easy to afford great relief in chronic dacryocystitis, or even to remove the symptoms almost completely, so long as the remedial means are in use; but to cure it thoroughly and permanently, so that we can say that the lacrymal passage is again as good as ever, is what is very rarely accomplished, so rarely indeed, that many practitioners make no pretensions to do so, but at once announce to the patient the necessity of employing, for life, some mechanical contrivance, by the aid of which, the tears shall be conveyed into the nostril.

The oftener the disease, already become in some measure habitual, has been attended with new attacks of acute inflammation, the less, in general, is our hope of completely curing it. If, in consequence of these relapses, a fistula of the sac should form, there sometimes follows almost a total closure of the nasal duct, while the

mucous surface of the sac itself becomes so thickened and fungous, that it is almost impossible to restore it to a healthy condition.

If the sac during this disease be not carefully and frequently emptied by pressure, its spontaneous evacuation will take place more and more seldom, the sac will become over-distended, the swelling even after the most complete evacuation will merely subside and not disappear, and an obvious laxity remain in the anterior part of the sac and in the parts by which it is covered. This is a particular state, of which I shall treat in a subsequent section, under the name of *relaxation of the sac.*

In a case of long-continued blenorrhœa, with stillicidium, I observed the pupil of the eye of the affected side become expanded and fixed, and vision dim, while on the other side no amaurotic tendency was manifest. By adopting proper measures for the relief of the blenorrhœa, the amaurosis was removed.

Local treatment. The local treatment necessarily varies according to the particular symptoms which are present, their severity, and their duration. The object in view is, by removing the inflammation, puriform discharge, and swoln state of the lining membrane of the passages, to restore the tears to their natural course. In every stage of the disease, we require to bear in mind the inflamed state of the mucous membrane, and the probability of stricture existing in the nasal duct. The principal points, therefore, of the local treatment, fall under the head either of antiphlogistic remedies, or of such mechanical means, as are likely to restore the nasal duct to its natural diameter.

1. *Leeches.* Even in the stage of *watery eye*, when the external signs of inflammation are not such as attract much attention, great advantage may be derived from the repeated application of leeches over the seat of the sac, or to the mucous membrane of the nostril. In the blenorrhœal stage, and especially during a renewed attack of inflammation, the pain, redness, and swelling of the integuments will still more evidently demand the employment of this remedy. Some surgeons attempt, in this disease, to pass a bent probe, from the nostril, through the nasal duct, into the sac, an operation always difficult, and often impossible to perform; but the hæmorrhagy, following the attempt, is often useful. I have even known it followed by the complete disappearance of the symptoms.

2. *Lotions.* Refrigerant lotions and emollient fomentations, applied by means of a piece of sponge or folded linen, over the sac, are useful in abating the inflamed state of the parts. Astringent lotions are also employed, especially in the blenorrhœal stage, in the hope that they may be taken up by the puncta lacrymalia, and conveyed through the canaliculi, into contact with the lining membrane of the sac and duct, an object more certainly effected by means of the syringe. A solution of *one* grain of muriate of mercury, with *six* grains of muriate of ammonia, in *eight* ounces of water, may be used for this purpose; or a solution of from *one* to *four* grains of nitrate of silver, in *one* ounce of distilled water. The

sac is to be emptied by pressure, the patient lying on his back; then, a little of one or other of these solutions is to be poured into the nasal angle of the eye, the patient remaining in the horizontal posture, until the fluid is supposed to have reached its intended destination. If the passage be patent, the solution of nitrate of silver will be tasted in the throat, in the course of a few minutes.

3. *Salves.* When the disease is complicated with disordered Meibomian follicles and conjunctiva, the red precipitate of mercury salve is often of advantage; not merely correcting the affection of the lids, but acting favourably upon the state of the lacrymal passages. About the bulk of a hemp seed melted on the end of the finger, is introduced on the inside of the lids, and rubbed into the neighbourhood of the puncta lacrymalia, once or twice a-day.

4. *Forced expiration and inspiration.* The patient ought to be directed to blow his nose frequently, and immediately afterwards to endeavour to empty the sac, down into the nostril, by pressure with his finger. He ought to be warned against emptying it through the puncta, as by doing so he must indirectly aid the tendency to stricture of the nasal duct. Closing the mouth and nostrils, he ought to inspire strongly, thus exhausting the air from the nostril, and nasal duct opening into it, and consequently removing their contents. These simple auxiliary means of keeping the passage free, are not to be despised. If the lacrymal passages be perfectly free, and the secretion of tears abundant, as it is in raw weather, inspiring and expiring suddenly and strongly, undoubtedly empties the sac and duct. Dr Jacob tells[3] us of an infant, cured of watery eye, by the nurse sucking the nose. Sternutatories will be found useful by exciting forcible expiration.

5. *Counter-irritation.* As a remedy of considerable use in chronic dacryocystitis, I may mention blisters and issues behind the ears and on the nape of the neck. The employment of sternutatories may also be serviceable by means of their derivative effect on the mucous membrane, as well as by exciting forcible expiration.

6. *Electricity* has sometimes proved useful. The method of employing it, is to insulate the patient, and with a wooden point, draw the electric fluid from the neighbourhood of the lacrymal sac, either in a stream, or in sparks. This is to be continued for three or four minutes every day. When an obstruction of the nasal duct is suspected, shocks may be passed down the duct, by placing one director upon the sac, and another up the nostril.[4]

7. *Anel's probes.* In the first and second stages, benefit may often be derived from the passage of small probes, such as were first recommended by Anel, through the puncta and canaliculi, and down the sac and duct, into the nostril. A set of gold or silver probes, six in number, varying from $\frac{1}{33}$th, to $\frac{1}{50}$th of an inch in thickness, is to be provided for this purpose. They must be perfectly round and smooth at their extremity, but need not be bulbous, and are not to be conical. The eyelid is to be put on the stretch, by pressing it somewhat towards the temple, with the fingers

of that hand which does not hold the probe, and its edge drawn a little forward, so as to bring the punctum into view. If we intend to pass the probe by the superior canal, we first of all introduce it perpendicularly into the punctum from below upwards until it reach the angle of the canal, and then turn it in a circle, until its point comes to be directed obliquely downwards and inwards, while at the same time we draw the lid somewhat upwards as well as outwards. If we are about to pass the probe by the inferior canal, we introduce it perpendicularly into the punctum from above downwards, and then lower the handle of the instrument to a horizontal direction. If the canals are patent, by continuing to press the probe onwards in the directions described, it enters the sac, so that we come to touch the nasal side of that cavity with the point of the instrument. Drawing back the point a little, to prevent it being entangled in the lining membrane of the sac, we now turn it in the direction of the nasal duct, *viz.* downwards and a little backwards, and press it slowly onwards till it strikes the floor of the nostril, which it will readily do, unless the duct is closed or much contracted.

The introduction of the probe is to be repeated from day to day, and though it is plainly impossible, by such a contrivance, to restore the nasal duct to its natural diameter, yet, by this means, in combination with others, and particularly injections, the obstructed state of the duct is often so far overcome, that the tears and mucus again flow into the nostril.

8. *Injections.* I have occasionally succeeded in completely curing slight incipient cases by injections with Anel's syringe, but much more frequently I have failed. The sac is first to be emptied, and if possible, downwards into the nostril. The syringe being filled with tepid water, its point is to be passed through one or other punctum, into the sac, in the manner already described for the introduction of the probe. The piston is now to be very slowly pressed down, when the sac becomes filled, and, if the passage is free, the water flows from the nostril, or into the back of the throat. If the passage is not free, the sac is left distended. We now endeavour to press the fluid, with which it is filled, down into the nostril, placing the finger for this purpose between the puncta and the sac, and pressing from the puncta towards the nose. We then take up with the syringe the medicated injection, and use it in the same manner. One or two grains of nitras argenti, or from two to four grains of sulphas zinci to the ounce of distilled water, will be sufficiently strong. These injections are to be repeated once every day, or every second day, immediately after the passage of the probe.

Sir William Blizard proposed[5] to treat this disease in its early stages by filling the sac with quicksilver; but this must be regarded more as a test than a remedy.

9. *Probes and injections introduced by lower aperture.* The method of Laforest[6] consisted in introducing probes into the nasal

duct from the nostril, and in throwing injections into the sac through tubes passed in the same way. In some subjects, it would be easy to do this; but the difficulties which were generally found to attend the introduction of a probe or a tube from the lower meatus of the nostril into the nasal duct, caused the practice to be entirely abandoned for many years. It has lately been revived in France, however, by Gensoul, Verpillat, and others.[7]

10. *Poultices.* If the patient suffers from a renewed attack of inflammation, and we fail in reducing it by the means already pointed out, we must proceed as in acute dacryocystitis, apply an emollient poultice, and wait till the suppuration advances.

11. *Incision of the sac, and introduction of a style.* As soon as the fluctuation of the abscess is distinct, we lay the sac open as has been directed in the last section. Even in cases where the swelling is small, we shall be surprised at the large quantity of matter which is discharged. On proceeding to examine the nasal duct with a common probe, we almost uniformly find it contracted at one or several points of its extent, so that it often requires very considerable force to press the probe through the duct, till it touches the floor of the nostril. To remedy this state of contraction, as well as to relieve the other symptoms, we generally introduce the nail-headed piece of silver wire, called a *style*, about $1\frac{1}{4}$ inch long and $\frac{1}{20}$th of an inch thick.

The introduction of a style is a very common, and a very useful method of treating chronic dacryocystitis, not merely after a renewal of inflammation, terminating in abscess of the sac, but in every stage of the complaint, except the first. In the blenorrhœal stage, after laying open a fistula of the lacrymal sac with the knife, and even in the stage of caries, we have recourse to the style. It is an instrument which generally may be worn for an unlimited time, not only without annoyance to the patient, but with a great degree of comfort. The probe being withdrawn, and a little tepid water injected, the style, previously passed through a bit of court plaister, is introduced from the sac into the duct, and pushed down so that the bit of plaister comes into contact with the integuments. The plaister serves to bring the edges of the incision as much together as the presence of the style will permit, and prevents the style from sinking into the wound. The wound closes gradually round the style, which is not to be entirely taken out for the first four or five days, but merely raised a little daily, so as to allow the parts to be cleaned. After the wound has healed so much that the opening closely embraces the style, (*Fig.* 33.) this is to be taken out every morning, the nasal duct injected with tepid water, or some weak astringent solution, and then replaced. The aperture through the

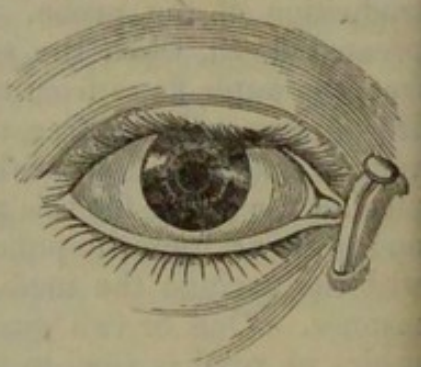

Fig. 33.

integuments into the sac soon becomes fistulous, having no disposition to close.

During the time that the style is worn, the previous symptoms disappear almost completely. The style dilates the duct, in the same way as a bougie dilates the urethra. The tears and mucus, absorbed by the lacrymal canals, appear to be attracted between the surface of the style and the lining membrane of the nasal duct, and thus the function of the parts being restored, the inflammation, watery eye, and blenorrhœal discharge quickly subside.

It frequently happens that a patient, after wearing a style for three or four months, has it removed, thinking the disease perfectly cured. After a time, however, the blenorrhœa returns, the style is re-introduced, and the symptoms again subside. After three or four months more, it again becomes a question, whether the style should be removed. The patient often objects to its removal. He knows the inconvenience of the disease, and the little trouble of the remedy, and prefers continuing the use of the style, rather than run the risk of the blenorrhœa returning. I have known even ladies object to giving up the style, having once experienced a relapse from its removal.

The style should be gold or silver gilt, to prevent it from becoming oxidized, and should have its head japanned of a skin colour, so that it may scarcely be observed, or blackened with sealing wax, so as to look like a little patch. The edges of its head should be rounded off, lest by pressure it cut the skin. It must on no account be left without regular removal and replacement. A patient in the lower ranks of life called upon me, with a silver style, which had been introduced by the late Dr Monteath, and which had not been taken out for more than six months. It was all but corroded through, about a quarter of an inch below the head.

In one instance, I witnessed profuse bleeding from the nostril during the day and night after pushing down a style. A short one had been worn, but not reaching the nostril, a longer one was introduced, and was followed by this effect.

It is important to remark, that the style itself is occasionally a cause of irritation. It often is so, for some days after it is first introduced. We are obliged to apply an emollient poultice over the sac, or even to withdraw the style. Months after it has been introduced, and proved highly serviceable, we sometimes find that the patient complains of matter being still discharged by the side of the style. In such cases, we should consider how far the style itself is the cause of this discharge; and if the Meibomian follicles, conjunctiva, and lacrymal passages, appear in every other respect sound, except only in the puro-mucous discharge by the side of the style, let it be gradually shortened, and at length removed, and a trial made whether every thing will not, now that the passage is patent, go on as it ought to do.

By shortening the style bit by bit, we try the state of the lower portion of the duct. If matters go on well with a short style, we

may conclude that the passage is healthy, and think of removing it entirely; but if the disease returns under the use of the short style, we must re-introduce one of the original length. When we withdraw the style, with the intention of no longer replacing it, the edge of the opening through the integuments must be made raw; for if this is not done, it is apt to contract to an almost capillary fistula, very difficult to close. Sometimes, indeed, this minute callous opening may, in itself, furnish a palliative cure[8] for chronic dacryocystitis. A lady consulted me, who had long been under the care of Dr Monteath, for blenorrhœa and relaxation of the sac. She had worn a style for a length of time, but without a cure being effected. Dr Monteath proposed laying open the sac and stuffing it, as is recommended in certain cases by Scarpa, but the patient declined this. The style was removed, the opening did not close, but continued patent for years; mucus continued to collect in the sac, and kept it greatly dilated; the eye was strong, and the patient thought nothing of the inconvenience of being obliged several times a-day, to press out the mucus through the callous orifice.

12. *Introduction of a tube.* This old practice, which was revived and extensively employed by Dupuytren, has often been brought forward anew, and again allowed to fall into neglect. The objections urged by Mr Ware and others against the introduction of a gold or silver tube down the nasal duct, there to be left for life or for an indefinite period of time, have chiefly been, either that it sank down through the duct into the nostril, or, exciting inflammation, was pushed upwards, by the swelling of the mucous membrane, so as to project under the skin covering the sac, and require to be removed. These objections, however may in a great measure be obviated, by employing a tube of an appropriate form and size. Instances are recorded, in which, with attention to those points, such an instrument has remained in the nasal duct for many years,[9] and has appeared to afford a complete cure, the inflammation of the sac entirely subsiding, and the transmission of the tears being perfectly re-established. The tube should be well polished internally.

It may fairly be doubted, whether the tears actually flow through the metallic canal, furnished to them by this contrivance, or descend merely on the outside of the tube, as they do along the surface of a style. The tube probably operates more in dilating the duct, than in affording a channel for the tears; and I am disposed to think, that a gold style furnished with a round head, of such thickness, as to allow it to sit easily in the lacrymal sac, but to prevent it from sinking down the duct, and over which the sac and the skin should be healed, and which should be worn for life, might answer the purpose just as well as a tube, or better.

If a tube is to be used, the sac is to be freely laid open, from the tendon of the orbicularis downwards and outwards, and the state of the duct examined with a probe. If sufficiently wide for the reception of the tube, this is to be introduced immediately; if contracted, it must be dilated, by a series of styles, or pieces of catgut of in-

creasing thickness. The tube (*Fig.* 34.) ought to be from three-fourths of an inch to one inch long, and taper gently from its upper to its lower extremity; the former is furnished with a projecting rim, measuring $\frac{1}{6}$th of an inch in diameter, whilst the latter measures $\frac{1}{12}$th of an inch. The tube is to be slightly curved in correspondence with the curvature of the nasal duct, that is to say, with its convexity forwards and its concavity backwards, and its lower extremity is to be truncated obliquely, so that its oval orifice shall look downwards and backwards. The instrument for introducing the tube

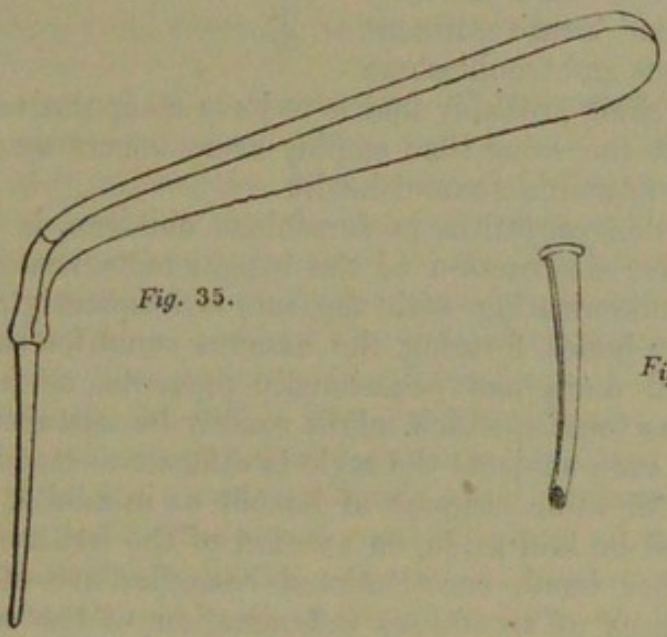

Fig. 35.

Fig. 34.

to the duct is a stylet, (*Fig.* 35.) with a handle joining it at an obtuse angle. The stylet fits into the tube so loosely that it may be easily withdrawn after the tube is fixed in its situation. Mounted with this instrument, then, the tube is to be introduced into the sac, and thence down into the duct; such a degree of pressure being exercised upon it, as to push the projecting rim to the bottom of the sac. The stylet is now withdrawn, and the lips of the wound being accurately adjusted, they are to be kept together with a bit of court plaister.

It occasionally happens that the presence of the tube produces so much irritation that it is necessary to remove it. This it is sometimes difficult to effect. In order to be provided against such a possibility, it is recommended that in the original construction of the tube, a groove should be sunk along the inside of its head, so that it may be laid hold of by means of a bifurcated stylet, the blades of which have a catch at their extremity, and by their elasticity separate from each other, unless kept together by a sliding ring. The sac being laid open by an incision, this instrument, with the blades closed (*Fig.* 36.) by the sliding ring, is to be pushed down the tube, the edge of which forces up the sliding ring, and the blades (*Fig.* 37.) diverge. By now drawing up the stylet, the catches at the end of its blades hook against the edge of the groove,

and by this means the surgeon gets such a hold of the tube, that it is easily withdrawn in a perpendicular direction. When this extractor is not at hand, the head of the tube must be laid hold of with a pair of forceps.

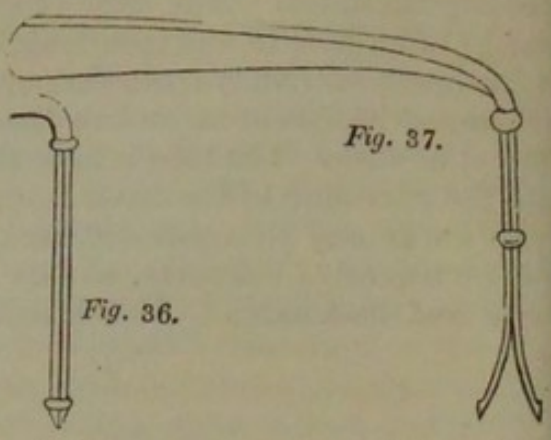

Fig. 37.

Fig. 36.

General treatment. However well chosen and carefully conducted our local treatment of this tedious and troublesome disease, we shall probably find it to have comparatively little effect, unless we at the same time employ every means we possess of improving the patient's general health.

Chronic dacryocystitis, in scrofulous children, is often attended with extensive destruction of the integuments round the fistulous opening communicating with the sac, is frequently connected with caries of the bones forming the osseous canal for the transmission of the nasal duct, and occasionally presents, as a complication, ulcers on the tonsils, which might readily be mistaken for syphilitic ulcers. In such subjects the style is difficult to manage, is not productive of the same amount of benefit as in adults, and not unfrequently must be laid aside, on account of the irritation it occasions. On the other hand, constitutional remedies are of much greater utility in cases of scrofulous inflammation of the sac in children, than in the chronic dacryocystitis of adults. I have seen a complete cure effected by the use of iodine, without any manual interference with the parts.[10]

In scrofulo-syphilitic cases, I have found the administration of equal parts of cinchona and sarsaparilla, in powder, very useful.

In weakly persons, whether scrofulous or not, the employment of the preparations of iron and cinchona will be found highly beneficial. When the prolongation of the disease depends on derangement of the digestive organs, it will be necessary to begin by restoring these to a healthy state. This will be best effected by small doses of blue pill at bedtime, followed by a laxative in the morning, as has been recommended by Mr Abernethy.[11] I have known a smart dose of calomel and jalap remove all the symptoms, even when the sac was filled with matter. In almost every case, advantage will be reaped from cold bathing, country air, and regular exercise.

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[1] *Dacryocystitis chronica. Blenorrhœa sacci lacrymalis. Watery eye* of Ware. *Flusso palpebrale puriforme* of Scarpa.

[2] Treatise on the Venereal Disease, p. 159; London, 1810.

[3] Dublin Hospital Reports; Vol. v. p. 377; Dublin, 1830.

[4] Cavallo on Electricity; Vol. ii. pp. 149, 167, 186; London, 1795.

[5] Philosophical Transactions for 1780; Vol. lxx. part i. p. 239.

[6] Mémoires de l'Académie Royale de Chirurgie; Tome v. p. 79; 12mo; Paris, 1787.

[7] Journal Hebdomadaire des progrès des Sciences Médicales; Tome i. p. 114; Paris, 1836.

[8] See Practical Observations on the Diseases of the Inner Corner of the Eye, by Joseph Reade; London, 1811.

[9] Ansiaux, Clinique Chirurgicale, p. 115; Liege, 1829.

[10] London Medical Gazette; Vol. x. p. 130; London, 1832. See Manson's Medical Researches on the effects of Iodine, p. 273; London, 1825.

[11] Surgical Observations on the Constitutional Origin and Treatment of Local Diseases.

SECTION IV.—FISTULA OF THE LACRYMAL SAC.

It must be apparent, from what has already been said, that fistula of the sac is usually the consequence of neglect in acute inflammation of the excreting lacrymal organs, or of reiterated attacks of inflammation during the course of chronic dacryocystitis. If the inflamed sac be not opened at the proper time, but the collection of puriform mucus be left to itself, it will form a passage through the fibrous layer by which the sac is covered, the orbicularis palpebrarum, and the integuments. The opening thus formed may close soon after, and every thing go on well. But in many cases, the opening merely contracts, manifests no disposition to heal, and degenerates into a fistula of the sac, through which a great portion of the mucus and tears taken up by the puncta are discharged, very little or none going down through the nasal duct. Lacrymal fistula is occasionally complicated with a fungous state of the sac, and generally with stricture of the nasal duct.

Prognosis. The least disagreeable circumstance which takes place when inflammation of the sac has ended in fistula, is an external cicatrice more or less visible. In general, the cicatrice is pretty deep, and may even produce a degree of ectropium. If the fistula be allowed to continue for a length of time, great contraction or even obliteration of the nasal duct, from disuse, is likely to be the consequence. The prognosis is favourable, when, on pressing the sac, tears issue along with the morbid mucous secretion, although not mixed with it; for this proves that the absorption of the tears by the puncta, and their conveyance into the sac, by the canals, are restored. The restoration of the nasal duct only now remains doubtful.

Treatment. When a case of fistula of the sac presents itself, we have first of all to ascertain with the probe whether the fistulous opening of the integuments corresponds or not with that of the sac. If they correspond, the point of a lancet is to be introduced into the fistula, and the opening both of the integuments and of the sac enlarged upwards and downwards. By the considerable opening thus made, some surgeons pass a quantity of soft lint, moistened with the vinous tincture of opium into the sac, but not to such a depth as to fill or stop it up. Over the lint is applied a piece of

adhesive plaister, and over that an emollient poultice. These are to be continued till no trace of the fistulous hardness remains. During this treatment, the passage of the tears into the sac is frequently re-established, and a similar restoration occasionally extends to their conveyance into the nostril. To ensure, however, an immediate transmission of the tears, we not unfrequently introduce a style into the nasal duct, as soon as we have laid open the fistula.

When the fistula is complicated, we carefully examine with the probe the fistulous opening or openings, and ascertain the direction of the sinuses. If these are superficial, they are to be laid open with a small bistoury, quite up to the sac. The opening into the sac is then to be enlarged upwards and downwards, as in the former case. The same treatment also as in simple fistula is to be followed.

Should one of the sinuses be so deeply seated, that in order to lay it open it would be necessary to divide a considerable quantity of muscular substance, vessels, and nerves, we content ourselves with enlarging the fistulous opening; after which we pass a common silver probe along the sinus to its commencement in the sac, and then divide the integuments immediately over the end of the probe, so as to form a counter-opening to the sinus. Through the sinus, diluted vinous tincture of opium is daily to be injected; the poultice applied as before, to discuss the hardness; and, this being gained, the cure completed by compression.

It may occasionally happen that one of the sinuses is so deeply situated, that a portion of the superior maxillary bone, over which it runs, has been laid bare or become carious. When this is the case, the fistulous opening is surrounded by fungous granulations, an ichorous matter is discharged, the integuments around are of a deep red colour, and the denuded or carious bone is felt with the probe. A solution of nitras argenti is to be injected into the sinus, and the lint with which the parts are dressed is to be moistened with tincture of myrrh.

No fistula is to be allowed to close, till the surgeon has made a careful examination of the lacrymal canals and nasal duct, and satisfied himself of their permeability and effectiveness.

There is still one variety of fistula, which must be noticed, *viz.* that which results from the wearing of a style. The purpose for which this instrument was employed being answered, by a dilatation of the nasal duct to its natural diameter, the style is removed, and the orifice through the skin contracts, but sometimes does not close. We try to close it by making its edges raw with the lancet, and touching it from time to time with lunar caustic. Some touch it with the actual cautery. These means occasionally succeed, but in other cases they fail, and tears continue to trickle from the minute opening, and inflame the cheek. In such a case two small concave incisions may be made around the fistulous opening, the intervening piece of skin extirpated, and the lips brought together by a stitch. So troublesome have such cases proved, that recourse

has sometimes been had to the transplantation of a flap of skin, and with success.[1]

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[1] Journal Complémentaire des Sciences Médicales; Tome xl. p. 388; Paris, 1831. Ammon's Zeitschrift für die Ophthalmologie; Vol. i. p. 405; Dresden, 1831.

SECTION V.—CARIES OF THE BONES AROUND THE LACRYMAL SAC AND NASAL DUCT.

It cannot be denied that carious fistula occasionally arises in the manner described in the third section. Neither is there any doubt that the os unguis and neighbouring bones sometimes become affected with inflammation from scrofula or syphilis, and that the inflammation in these cases may terminate in caries.

In caries of the os unguis from constitutional causes, the swelling is more deeply seated, and the symptoms of disease in the excretory apparatus of the tears more slowly developed, than in primary affections of the lacrymal sac. For some time after the obscure tumefaction has continued, with very considerable pain, in the neighbourhood of the os unguis, the excreting lacrymal organs continue to execute their functions; whereas the tears are no longer absorbed nor conveyed into the nostril, when the mucous membrane is the part first affected. At length, the lacrymal sac and nasal duct becoming inflamed, the symptoms bear a nearer resemblance to those described in the preceding sections. The posterior part of the sac becomes ulcerated, and unless some successful plan of treatment be adopted against the constitutional disease, the caries of the bones and the ulceration of the soft parts continue, the integuments give way, a fœtid ichor is discharged, and the excretory lacrymal passage may be destroyed.

General treatment. In such cases, if the local affection depends upon syphilis, the proper remedies against that disease are to be exhibited. A tonic plan of treatment must be followed, if the caries appears to be of scrofulous origin, and a course of iodine will be found advantageous.

Local treatment. No operation practised upon the diseased bone can be of any use, either while the scrofulous or syphilitic action is going on, or afterwards. On the contrary, such operation would in all likelihood exasperate the disease. The introduction of a style, and the cautious injection of a solution of nitras argenti, make up the local treatment. The former serves to attract the tears along their natural course, while the latter corrects the blenorrhœal discharge, represses the tendency to fungus, and improves the condition of the bone.

It sometimes happens that the style drops out of the lacrymal

passage into the antrum, or into the mouth through a carious aperture in the palate. This may happen not only in syphilitic, but in scrofulous cases, followed by ulceration spreading round the eye, and affecting the septum and alæ of the nose; the vomer comes away with pieces of the superior maxillary bone, and the nose falls in. In scrofulous cases of this sort, I have found sarsaparilla eminently serviceable.

SECTION VI.—RELAXATION OF THE LACRYMAL SAC.[1]

The lacrymal sac is sometimes protruded from its natural situation, without much unnatural dilatation,[2] a state of parts which has been called *hernia;* but, in general, this term has been applied to the affection of the sac I am now about to describe.

Symptoms. The sac presents a tumour, of the shape, and generally about the size, of a horse-bean; sometimes, however, much larger; the integuments covering it are scarcely or not at all discoloured, it is not painful, and it yields more or less easily to the pressure of the finger. These symptoms are sufficiently characteristic to distinguish *relaxation* from *mucocele.*

Upon pressure, the contents of the sac in the state of relaxation are generally discharged either by the canals and puncta, or by the nasal duct, according to the direction in which the pressure is applied. Sometimes, however, the sac can be evacuated only down the nasal duct. The fluid is usually transparent, or presents merely a streak of whitish matter; but occasionally, from the presence of blenorrhœa, it is entirely yellowish and opaque. Upon evacuation of the sac, the tumour is almost completely removed, but its integuments remain folded and wrinkled, and it very soon becomes filled again. If the fluid does not consist of mucus duly mixed with tears, but presents whitish streaks, or if it consists entirely of a catarrhal matter, we feel a little elasticity in the sac after the evacuation, and there remains some degree of swelling. These appearances are to be attributed to the tumefaction of the lining membrane of the sac, and are totally wanting in the more common cases of relaxation.

The sac in the state of relaxation has lost its natural contractility of texture. Even that part of the orbicularis palpebrarum which covers the sac, and to which the duty of emptying it belongs when it becomes filled with fluid, having suffered from long-continued extension, is incapable of contracting with a sufficient degree of force, and is in fact exactly in the state of the muscles of the abdomen after the removal of the water of an ascites. The patient is consequently obliged to do with his finger, what ought to be done spontaneously by the parts themselves. He is obliged to evacuate the sac by pressure frequently in the course of the day, and it is fortunate if he begins and continues the practice of evacuating it by

the natural route through the nasal duct, and not through the lacrymal canals.

The general cause of relaxation is over-distention of the sac by puriform mucus, during neglected dacryocystitis. Sometimes, as has been already stated, blenorrhœa still continues, or has recurred. Most frequently the blenorrhœa has disappeared, and left relaxation behind it, along with an excessive secretion of healthy mucus. In this case we are called upon to limit this secretion, and to restore their natural cohesion and elasticity to the anterior side of the sac, the orbicularis, and the integuments, in order that the important function of evacuating the contents of the sac through the nasal duct may be resumed.

Prognosis. We ought to forewarn the patient that the cure will be tedious, and require much attention upon his part.

Treatment. This consists in the use of two distinct means, each of which, as may be seen by the testimony of Pellier and others, is, when used alone, apt to fail.[3]

The *first* is the compression of the sac; and here let it be observed, that the present is the only case in which compression of the sac is useful. In any other disease of that part, this practice would produce only injurious effects. The compression must be carefully applied, constantly continued, and gradually increased. Machines have been invented for this purpose, but they never fulfil with precision all these conditions. We cannot by such an instrument as Sharp's or Petit's compressorium, the first invention of which we owe to Hieronymus Fabricius, keep up a regular and an increasing pressure; the compressing surface upon the least occasion, especially during the night, is disarranged; and the patient is hindered from pursuing his business by the presence of such an apparatus. Graduated compresses, then, are to be preferred; over these a firm leather pad of a proper form is to be placed; and the whole is to be supported by a narrow roller passing round the head. In this manner, the pressure affects exactly the part which ought to be acted upon; it can be daily increased; the pad cannot, even when the patient is very restless, be shoved aside; nor need such an apparatus prevent him from following his ordinary employment, even out of doors.

The *second* part of the treatment consists in the application of some astringent fluid, both to the external surface of the tumour, and to the internal surface of the relaxed sac. A great variety of astringents might be mentioned as proper for this purpose; such as solution of alum, infusion of oak bark, &c. The graduated compresses are to be moistened twice or thrice daily with the astringent fluid which may be selected. A small quantity also of the same, or of some similar fluid, is to be dropped into the lacus lacrymarum, and left to be absorbed by the puncta.

I have known these means fail after the most careful trial. A medical gentleman, who came under my care with relaxation of the lacrymal sac, found pressure hurtful rather than useful. He derived

considerable benefit from oak-bark decoction, dropt into the lacus lacrymarum, and used as a lotion. The disease arose without blenorrhœa, merely from the tears and mucus accumulating in the sac. Blenorrhœa afterwards supervened. If the patient went to bed with the sac distended, he found it empty in the morning. The use of a style afforded this patient the most relief. In another case, a fistulous opening, left after the removal of a style, afforded to the patient the means of emptying the sac, once or twice a-day, of a large quantity of healthy mucus. In such a case as this, the sac might be exposed by dissection, and a large portion of it removed with the scissors, an operation sometimes had recourse to in mucocele.

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[1] *Hernia sacci lacrymalis* of Beer.
[2] Archives Générales de Médecine ; Tome xx. p. 578 ; Paris, 1829.
[3] Pott, Observations on the Fistula Lacrymalis; Works, Vol. i. p. 252; London, 1808. Pellier de Quengsy, Cours d'Operations sur la Chirurgie des Yeux; Tome ii. p. 270; Paris, 1790.

SECTION VII.—MUCOCELE OF THE LACRYMAL SAC.[1]

Symptoms. This disease presents in its commencement the oblong shape of the sac, the tumour which it forms slowly increases, and I have seen it reach the size of a pigeon's egg without bursting. In some cases the tumour appears double, being partially divided by a depression in its middle. The integuments covering the tumour, are commonly of a livid colour. A mucocele is often so hard that it scarcely yields at all to the pressure of the finger. In other cases, it is soft and elastic. But whether hard or soft to the touch, no degree of pressure is capable of evacuating, either through the puncta or into the nostril, the mucus which in this disease is pent up within the sac. A mucocele may reach a very considerable size, and continue of the same magnitude, and without pain, for many years; the eye watery, the nostril dry, and considerable deformity resulting from the bulk and appearance of the tumour. It is not until the over-filling of the sac has reached its highest possible degree, and the mucocele threatens to burst, that the disease is attended with a painful feeling of tension. The patient at this period cannot more than half open his eyelids on account of the size of the tumour. The lower lid especially is put on the stretch, and projected towards the nose. The sac is also very considerably extended within the orbit.

On examining a mucocele, we distinguish only a very indistinct, and in many cases, not the least fluctuation. This depends upon the state of the contained mucus, which may be in some measure liquid, or may have acquired a gluey consistence. In the former

case, the colour of the integuments is purplish, an indistinct fluctuation is felt, the tumour is still a little elastic, and does not exceed the size of a horse-bean. In the latter case, we sometimes find the colour of the integuments blue, like that of a varicose vein, the mucocele feels hard like a pebble, and presents not the slightest degree of fluctuation, while the tumour is already so large as to rise over the caruncula lacrymalis.

The frequent livid colour of the integuments, in mucocele, has led some authors to describe this disease under the name of *varix of the lacrymal sac;* while the hardness and size of the tumour, added to its colour, have sometimes led to the extirpation of the sac affected with mucocele, under the idea that it was a carcinomatous tumour.

Causes. Mucocele is the consequence of an obstructed state of the lacrymal canals and nasal duct. The natural secretion of mucus from the internal surface of the sac goes on, but as it can neither be diluted by the tears, discharged into the nose, nor completely re-absorbed by the membrane which secretes it, it accumulates, and forms the tumour in question.

Mucocele very rarely occurs after inflammation of the excreting lacrymal organs has been so violent as to cause absolute obliteration of the nasal duct. When the inflammation is so violent as to effect this, it almost constantly destroys the sac at the same time, so that neither mucocele nor relaxation can ever afterwards take place. It is upon obstruction, then, and not obliteration of the nasal duct, that mucocele commonly depends, and this obstruction is accompanied by a similar affection of the lacrymal canals.

Treatment. The lancet is to be pushed into the most prominent part of the tumour. The wound is then to be enlarged upwards and downwards in the direction of the length of the sac, both that its contents may be easily evacuated, and that we may be able to proceed without difficulty in the remaining steps of the treatment. In performing this operation, as well as in enlarging a fistula of the sac, it is better to avoid, if possible, dividing the tendon of the orbicularis palpebrarum. Yet the inconvenience arising from cutting that tendon across is much less than might have been supposed; for after the wound has healed, the eyelids retain their natural position, and the muscle performs its functions as before. This is to be attributed partly to the ligamentous layer which lies beneath the muscle and supports the eyelids, and partly, as Mr Sharp has remarked,[2] to the firm cicatrice which is left when the cure is completed. In dividing the tendon, however, there is a danger of cutting across the canaliculi, which would probably produce incurable stillicidium.

If the mucus be liquid, a little of it issues as soon as the incision has been completed. The remainder is to be cleared out, by means of a small syringe introduced by the wound, through which a quantity of water is to be repeatedly injected. If the mucus has become inspissated, it is to be extracted by the repeated introduction of a

small pair of forceps; after which, the sac is to be completely washed out.

A small quantity of soft lint is now to be placed within the lips of the wound, and covered with a piece of court plaister. Next day, the lacrymal canals and nasal duct are to be examined, and the causes of the mucocele being ascertained, the proper treatment is to be commenced.

In cases of very large mucocele, it may be proper to lay bare the sac in the first instance, and remove a portion of it with the scissors.

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[1] *Hydrops sacci lacrymalis* of Beer.
[2] Treatise of the Operations of Surgery, p. 181 ; London, 1758.

SECTION VIII.—RELAXATION OF THE PUNCTA LACRYMALIA AND CANALICULI.

We sometimes meet with cases in which the lacrymal puncta and canaliculi are in a state of relaxation, attended, probably, with atony of the tensor tarsi; the consequence of which is *stillicidium lacrymarum*, a symptom uniformly depending on some obstacle to the absorption and conveyance of the tears from the eye into the nose, and therefore to be carefully distinguished from the superabundant lacrymal secretion styled *epiphora*.

Symptoms. The puncta stand widely open, are turned forwards from the conjunctiva of the eyeball, with which they naturally are in contact. They appear to have lost their contractile and absorbing power. The quantity of tears, which from time to time roll over the cheek, is not considerable; they fall in single drops, at intervals, and only from the nasal angle of the eye. The nostril belonging to the affected side is dry, as little or none of the fluids collected in the lacus lacrymarum is conveyed into the sac, there to mix with the mucus secreted by its lining membrane, and thence to be discharged into the nose.

Erysipelatous inflammation of the eyelids, or of the integuments covering the lacrymal sac, and puro-mucous ophthalmia, are apt to give rise to this patulous state of the puncta; but perhaps the most common cause is an injudicious use of Anel's probes and syringe in the treatment of chronic dacryocystitis. Schmidt mentions two cases which fell under his observation in which the papillæ lacrymales were absolutely split, in consequence of the repeated introduction of these instruments.

Prognosis. This, in ordinary cases, is favourable; for the disease will either disappear under the influence of warm and dry

weather, or may be removed by the careful employment of astringents.

Treatment. A solution of borax in peppermint water, with a small quantity of camphorated spirits, or of tincture of opium; a solution of the sulphate of iron; or a pretty strong solution of the lapis divinus, with the same addition of spirit or of tincture may be used. One of these, with a hair pencil, is to be applied to the relaxed puncta, and afterwards dropped into the nasal angle of the eye, several times a-day, the patient lying on his back for some minutes after the application.

SECTION IX.—OBSTRUCTION OF THE PUNCTA LACRYMALIA AND CANALICULI.

The puncta are sometimes congenitally absent. This may or may not be attended by defect of the lacrymal canals. If no vestige of the puncta can be discovered, the case is hopeless.

In another set of cases, the puncta are contracted, but are still patent, and may easily be dilated with the point of a middle-sized pin, after which Anel's probe will pass without difficulty. This case is attended with stillicidium, sometimes with paleness of the semilunar fold and caruncle, and occasionally a dry, almost horny state of the latter.

The most frequent cause of obstruction of the canals is tumefaction of their lining membrane, continuing after all the other symptoms of acute or chronic dacryocystitis have disappeared.

If the sac has been laid open by an incision, or if a fistula of the sac has formed, neither the artificial opening nor the fistula is to be healed up, till we be assured of the healthy state of the lacrymal canals. The state of the canals is also to be ascertained on the day following the opening of a mucocele.

It is our object to ascertain, not merely whether the lacrymal canals be obstructed, but also the cause of their obstruction. This may depend upon the presence of inspissated mucus, tumefaction of their lining membrane, stricture, or absolute obliteration in a part or throughout the whole of their extent.

For the examination of the canals we make use of Anel's probe, which is to be introduced in the manner described at page 255. If upon continuing to press the probe onwards, it enters the sac, so that we come to touch the nasal side of that cavity with the point of the instrument, we are assured that there is no obliteration of the canals. If an obliteration exists, a state of the canals which we may partly suspect beforehand from the contracted appearance of the papillæ and puncta, we find an inconquerable obstacle to the passage of the probe, and ascertain at once the extent and situation of the obliteration.

When the presence of mucus is the sole cause of the obstruction, the conveyance of the tears through the canals is immediately restored by carrying the probe onwards into the sac. When there is tumefaction of the mucous membrane, the conveyance of the tears is not restored by merely sounding the canals, for as soon as the probe is withdrawn, the contraction of their caliber returns. Such tumefaction, indeed, depends in every case upon inflammation, and consequently will subside only as this disappears.

When one or both of the canals are contracted or obliterated through a small part of their extent, for instance for the length of a line, we ought to force the probe, but not violently, through the stricture or obliteration into the sac. The edges of the eyelids ought to be kept moist, for some days after, with a thin and mild ointment, and the probe passed daily along the canal into the sac.

When the canals are completely obliterated, I know of no remedy. It is easy to describe methods of making new puncta and canals, but it is another matter to get these new puncta and canals to absorb and convey the tears. In such a case, some have recommended to lay the sac completely open, apply caustic to its lining membrane so as to excite a degree of inflammation, and then by compression, endeavour to secure the obliteration of its cavity, or to dress it for some time with strong red precipitate ointment, and gradually allow it to contract. These means are recommended for the purpose of preventing abscesses of the sac, or the formation of mucocele.

SECTION X.—OBSTRUCTION OF THE NASAL DUCT.

In suspected cases of strictured nasal duct, when there is no opening into the sac, Mejan[1] Cabanis,[2], and others attempted dilatation by means of a mesh, drawn up through the duct, and into the sac, by means of a thread, previously introduced into the nostril from the upper punctum ; while Anel, Travers,[3] Jacob, and others, have recommended that probes and other means for removing the stricture should be passed down from the puncta, through the sac, and into the duct. Both these modes of practice have been found to be painful, dangerous, and ineffectual. They not merely fail in the object intended, but are apt to end in incurable atony of the puncta, by causing them to split, or to ulcerate, and are therefore generally abandoned. I would recommend those who feal inclined to try dilatation of the nasal duct through the puncta, to read Dr Jacob's account[4] of the matter. I think the difficulties and objections stated by a professed admirer of the practice, will be sufficient to convince them of the futility and danger of this mode of treatment, even though attempted with bristles from the tail of a hippopotamus.

An examination of the nasal duct, equally as of the canaliculi, is

to be instituted before healing up any artificial opening or fistula of the sac; also, on the day after a mucocele has been laid open.

The best instrument for examining the nasal duct is a silver probe, about $\frac{1}{20}$th of an inch thick, and not bulbous. This is to be introduced horizontally by the opening which has been made through the skin into the sac, till it touches the nasal side of that cavity; it should then be raised into a vertical position, and its point directed downwards and a little backwards. Turning the probe upon its axis, we pass it from the sac into the duct; and as we continue to press it gently downwards, the instrument, if the duct is pervious, slides into the nose. If its point meet with some obstruction, we must not immediately conclude that there is an obliteration of the duct. We must press down the probe a little more strongly, yet without violence; turning it round between the fingers, and giving it different directions. The natural course of the duct is not straight, but somewhat curved, the convexity of the curve being directed forwards, and the concavity backwards. Should the straight probe, therefore, not easily pass, it should be withdrawn and slightly bent, to correspond to the curvature of the duct. By these means, the obstacle may frequently be overcome, and the probe suddenly descend.

If the obstacle remain as before, and is extremely firm, still this is not sufficient ground for us to conclude that there is a real obliteration; because there are many other causes, particularly diseased states of the mucous membrane, from which the difficulty we encounter may proceed. The membrane may be tumefied, its mucous cryptæ enlarged and indurated, and thereby the caliber of the duct more or less diminished, yet these obstacles may be capable of yielding, so that by considerable pressure we may succeed in passing the probe into the nose. In other cases, the tumefaction and induration of the mucous membrane may yield so little, as to render it impossible to reach the nose with a probe of the ordinary size, and it requires great patience to pass a small silver probe through the duct.

If we succeed, though it may not be without considerable difficulty and after many trials repeated during several days, in bringing a probe into the nose, which we can easily recognise by the hitting of the end of the instrument against the floor of the nostril, as well as from the feeling of the patient, we remain convinced that it is yet possible to restore the whole excretory apparatus of the tears to the exercise of its function.

Though the nasal duct does not exceed two-thirds of an inch in length, there are three points in its course at which stricture is particularly apt to occur. One of these is exactly where the sac ends and the duct begins. The caliber of the duct is frequently narrowed there by a circular fold, the thickening of which will cause obstruction. Janin[5] details the appearances upon dissection of a stricture in this situation, and describes the mucous membrane of the duct as presenting a plaited appearance like the sleeve of a shirt

at the wrist. A second fold of the same kind occurs[6] in the middle of the duct, in many subjects, though not in all; and hence this part becomes from a similar cause the frequent seat of stricture. The third, and perhaps the most usual situation of stricture is at the termination of the duct in the nostril.

In order to treat of the restoration of the nasal duct with precision, I shall consider three different cases. The first is when we have already passed a probe through the duct. The second is when we do not at first succeed in passing a probe, but in which it is yet possible to pass it. The third case is when it is impossible to pass any probe through the duct.

First case. If we have succeeded with the silver probe, we ought immediately to introduce a nail-headed silver style of the same size, and about an inch and a quarter long into the duct. We now proceed progressively to restore the duct to its natural caliber. This may be done by a series of silver styles, or of catgut or gum-elastic bougies, introduced from the sac; or by a seton, or mesh of silk threads, drawn up from the nostril.

If we prefer the mesh, we introduce, by the opening into the sac and down the duct, a bit of fine catgut, having a strong doubled silk thread fastened to its upper extremity. The catgut is to be pushed well down into the nostril. In the course of a few days, and sometimes in a few hours, the lower end of the catgut having become soft, may be forced out of the nostril by blowing the air through it, with the opposite nostril shut. The catgut is then to be drawn out, followed by the doubled silk thread, the catgut is to be removed, and into the loop of the silk thread a mesh is to be placed, formed by another thread, doubled several times upon itself, and long enough to hang out of the nostril. The upper end of the first thread, where it projects through the opening into the sac, is now to be laid hold of, and drawn slowly upwards, till the mesh is introduced into the nasal duct. The first thread must now be coiled up, the coil laid upon the side of the nose, and covered with a bit of court plaister, while the lower end of the mesh is to be turned round and fixed in the same manner to the ala nasi. After a few days, having loosened the upper end of the first thread, and the lower end of the mesh, from these attachments, we lay hold of the latter and pull it downwards, till it is fairly out of the nostril, and the looped lower extremity of the first thread again brought into view. The mesh is now to be withdrawn, and a thicker one, being introduced into the loop of the thread, is to be drawn up into the nasal duct; and in this way a succession of meshes is to be employed, till the necessary dilatation is accomplished. One advantage of this method is, that the mesh, being introduced into the duct from its lower orifice, the opening into the sac is allowed to contract to a small size.

For dilating the nasal duct, Beer employed the common catguts of the violin. He began with the string E. Having softened its point between the teeth, made seven or eight inches of it perfectly straight,

and dipped it in a little oil, he introduced it first horizontally and then vertically into the sac, and thence into the duct. He pushed it down slowly, till five or six inches of it had descended, in order that its inferior extremity might be drawn forth from the nostril without difficulty, a part of the operation which was left to the patient. The superior part of the catgut was coiled up, enclosed in a piece of linen, and fastened under the hair of the forehead. Into the opening of the sac a little lint was laid, and over that a piece of court plaister was applied.

The patient was directed to try, after two or three hours, to bring the inferior end of the catgut out of the nose, by shutting his mouth and the opposite nostril, and driving the air through the nostril into which the catgut had descended. When he felt it advance, he drew it out of the nostril, with the blunt end of a knitting needle, turned up its extremity to the side of the nose, and fixed it there by a slip of court plaister.

On the following day, the lint was removed from the opening of the sac, and a quantity of one of the collyria which will be afterwards enumerated, was injected by the side of the catgut. This injection was intended as well to wash away any mucus accumulated in the sac, as to act upon the mucous membrane. The superior end of the catgut was now loosened from the forehead, a sufficient fresh portion undone from the coil, and being besmeared with one of the substances which I shall mention, drawn into the duct by the patient taking hold of the extremity, which hung from the nose. The portion of catgut which had been used during the preceding day was now cut off, and the new end turned up to the side of the nose, and there fastened as before. The same injection was now repeated, the lint and plaister applied to the opening of the sac, and the coil of catgut bound up.

In this manner Beer proceeded day after day till the catgut E was completely used. Before passing a new catgut, the point of a syringe was introduced through the sac into the duct, and a quantity of tepid water coloured with vinous tincture of opium, injected, care being taken to observe whether any part of the fluid was discharged by the nostril.

The string A was now passed as E had formerly been, and its use was continued exactly in the same manner. When it was finished, the injection of a coloured fluid was repeated, in order to ascertain what progress had been made in restoring the natural diameter of the duct.

The string D followed. After its use, the injection was almost constantly found no longer to drop merely, but to flow freely from the nostril. Were this not the case after the employment of one D, this catgut was repeated till the injection was discharged from the nose in a full stream. Then, and not till then, the treatment was brought to a close.

If the mucous membrane of the duct, when the use of the catguts was commenced, was merely somewhat tumefied, and opposed no

great obstacle to the probe, the portion of catgut daily introduced was moistened with the vinous tincture of opium, and a quantity of the solutio lapidis divini[7] made lukewarm was injected by the sac. The lint, too, with which the wound of the sac was dressed, was dipped in the vinous tincture of opium.

If the tumefaction of the mucous membrane was firm, so that the silver probe could not be brought into the nose, without much opposition, the catgut was besmeared with citrine ointment, at first very much diluted, but gradually increased in strength. The same ointment was applied to the wound. For an injection in the same case, a solution of corrosive sublimate was employed, together with some vinous tincture of opium. If the cryptæ of the mucous membrane were indurated and enlarged, so that the probe was felt passing successively over a number of little knots, a weak ointment of red precipitate was employed for besmearing the catgut, and the patient was directed, daily, before the catgut was drawn, to rub in a small quantity of camphorated mercurial ointment around the opening of the sac.

Similar applications may be used, if we prefer gum-elastic bougies, or silver styles, for restoring the nasal duct to its natural caliber. Whichever of these instruments we select, its employment must be continued for several months, and the wished-for restoration effected very gradually, knowing that if we remove the stricture or obstruction suddenly, it will almost to a certainty return.

When we consider ourselves warranted to discontinue the dilating instrument which we have employed, we may try the experiment of dropping a deeply coloured fluid into the lacus lacrymarum, observing whether it appears at the opening into the sac; for the little valvular fold which in many subjects covers the opening of the canals into the sac,[8] is apt to become closed from the long-continued pressure of a foreign substance. Should the valve be shut, it must be forced open by the Anelian probe passed through the canals.

The wound of the sac is now to be dressed once a-day with plain lint. The coloured fluid is to be daily injected. If for fourteen days successively it flows in a full stream from the nose, we proceed to close the wound. We make its edges somewhat raw with the lancet, and then bring them together with adhesive plaister.

Second case. If the silver probe sticks fast in the duct, we may leave it there till next day, fastening it to the forehead by a proper bandage, closing the opening of the sac with a little lint, and applying over the lint a piece of court plaister. For a week we ought not to despair of overcoming the obstruction, not by main force, but by gentle and daily repeated endeavours to get the probe a little and a little farther through the duct, turning the instrument on its axis at every trial, and varying the direction of the pressure. If we succeed in this manner, we continue the treatment as has been explained under the first case. If we fail, this second case must be treated as the third.

Third case. Two causes may conspire to the obliteration of an

mucous canal. The one is when the substance of the tube becomes violently inflamed, and consequently extremely swoln: the other when the matter of secretion or of excretion, which in the natural state of things is constantly or frequently moving through the canal, ceases any longer to pass. When, for instance, a portion of the substance of the urethra is inflamed, its caliber becomes much contracted in consequence of the tumefaction of the parietes of the canal, and this contraction, after the inflammation has subsided, frequently remains permanent, under the name of stricture, in consequence of lymph effused into the sub-mucous cellular tissue. There are two causes why the contraction is not so great in this case as to close the urethra completely, namely, the considerable size of the canal, and the frequent and forcible passage of the urine. Let a small canal, such as the nasal duct, be inflamed to the same degree, and let no secreted fluid be pushed violently through it, let even the secretion, which in health slowly drops along its internal surface, cease, and then it is little to be wondered at, if it come at last to be completely closed. As soon as a mucous canal ceases to be employed in the discharge of its functions, it begins to contract. If a man have a false passage from the urethra, through which the urine is entirely discharged, the portion of the urethra anterior to the false passage being no longer in use, gradually contracts, so that any appearance of a canal there, is distinguished with difficulty. The analogy of the two cases is obvious.

I do not mean to assert, that the obliteration of the nasal duct, is, in every case, the consequence either of tumefaction of its parietes, or of contraction from disuse. When the mucous membrane of this canal becomes ulcerated or excoriated, as I have no doubt it occasionally does in the course of inflammation, an effusion of coagulable lymph, and a consequent adhesion between the sides of the duct, may give rise to the very worst variety of obliteration.

If, in our examination of the nasal duct, we have discovered part of its extent to be obliterated, recourse must be had to perforation by means of a small triangular or trocar-shaped probe. If the extent of the obliteration be inconsiderable, this perforation may be performed with a confident hope of success. A few drops of blood flow from the nose as soon as the perforation is completed. The probe is immediately to be withdrawn, and a small silver style introduced. This remains for a day or two, and then the very gradual dilatation of the duct, which has already been described, is to be commenced.

If a considerable portion of the duct, or even its whole extent, be obliterated, the same operation ought to be performed. This is done with at least equal hopes of success as if we perforated the os unguis. It is true, that nature, constantly tending to destroy every thing contrary to the organic system which she has adopted, would probably close the new passage, after our dilating instruments were laid aside. In this case, then, the introduction of a gold tube or style into the duct, to be left for life, is peculiarly indicated. The surrounding substance will contract upon the tube or style,

and render it less liable to be displaced, than a similar instrument passed into the natural caliber of the duct.

It has often occurred to me, that in cases of strictured or obliterated nasal duct, recourse might be had with advantage to the use of a small bougie, armed with lunar caustic. This might be applied from time to time, exactly as we employ the same means in stricture of the urethra, introducing the bougie from the lacrymal sac down into contact with the strictured or obliterated part of the duct, keeping it there for two or three minutes, and after withdrawing it, injecting the duct with tepid water. Both in Germany and in France, a similar plan has been employed with success.[9]

Besides the presence of foreign substances in the nostril, and the pressure caused by polypus nasi, there is one cause of obstructed nasal duct, of a formidable nature, which I must notice before leaving this subject, namely, exostosis of the osseous passage through which the duct descends. "I have found," says Mr Travers, "the canal completely obliterated by ossific inflammation at its upper orifice in skulls."[10] I have met with one case of this kind on dissection, and what is worthy of remark, the individual, as far as I could learn, had not been much, if at all, troubled with stillicidium lacrymarum.

If no passage is obtained for the tears and mucus from the sac into the nostril, the patient will be exposed to perpetual attacks of inflammation in the sac, which will give rise to much distress, and to the formation of fistulæ. In such a case, I have seen attempts made to obliterate the sac, by laying it completely open, and dressing it with escharotics. It is much more difficult to obliterate the sac in this case, than in that which I have described at page 270. Indeed, the obliteration will not be obtained, unless we manage permanently to close the apertures of the lacrymal canals into the sac. If these remain patent, the tears flowing through them will gradually re-dilate the sac. If we cut the canals across, the apertures next the sac will close, so that the tears will not reach the sac.

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[1] Mémoires de l'Académie Royale de Chirurgie; Tome v. p. 111; 12mo; Paris, 1787.

[2] Ibid.

[3] Synopsis of the Diseases of the Eye; p. 372; London, 1820.

[4] Dublin Hospital Reports; Vol. v. p. 381; Dublin, 1830.

[5] Mémoires et Observations sur l'Œil, p. 115; Lyon, 1772.

[6] Soemmerring, Abbildungen des Menschlichen Auges, p. 32; Frankfurt am Main, 1801.

[7] ℞ Æruginis, Nitri puri, Aluminis, utriusque pulverisati ℥ iii. Liquefiant in vase vitreo super arenam calidam. Liquefactis adde Camphoræ tritæ ʒ iss. Misce. Massa refrigerata servetur sub nomine Lapidis Divini. ℞ Lapidis Divini gr. x—xx. Aquæ distillatæ ℥s. Solve, et cola. Colaturæ adde Vini Opii ʒ — ʒ ii. Aquæ Rosarum ℥ iv. Misce.

[8] Rosenmüller, Partium Externarum Oculi Humani Descriptio; § 125. Lipsiæ, 1810.

[9] See a paper by Dr Harveng, of Manheim, in the Archives Générales de Médecine; Tome xviii. p. 48; Paris, 1828.

[10] Op. Cit. p. 243. See a case of Exostosis of the Os Unguis, operated on by Dr Krimer, in Gräfe und Walther's Journal; Vol. xii. p. 156; Berlin, 1828.

SECTION XI.—CALCULI IN THE EXCRETING LACRYMAL PASSAGES.

We have already spoken (page 107) of calculi deposited from the tears, and lodged in the sinuses of the conjunctiva.

The lacrymal canals are sometimes obstructed by similar depositions. "In more than one instance," says Mr Travers, "I have turned out a considerable quantity of calcareous matter wedged in those ducts, like the calculi of the salivary ducts."[1]

Turberville tells us of a saddler's daughter, who had an impostume, which broke in the corner of one of her eyes. Out of it there came about thirty stones as big as pearls; after which she had a fistula, which he cured.[2]

Dr Krimer relates the following case:—

Case 147.—A woman had for nine months been affected with disease of the excreting lacrymal organs. The sac was swelled, hard, and upon the most prominent part of the tumour, which was red and painful, there was a small ulcer which penetrated into the sac, and discharged pus, mixed with tears, especially on pressure. The nasal duct appeared entirely obliterated. When, in order to re-establish it, Dr Krimer endeavoured to introduce a pointed probe, he withdrew on its extremity a concretion of the size of a small pea, the removal of which left the canal entirely free, and the fistula was promptly cured. The calculus was ash-gray, covered with thick mucus, polished, of a calcareous appearance, and insoluble in water, alcohol, and weak vinegar. Dr Krimer thinks that it was formed in the lacrymal sac, by inspissated mucus.[3]

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[1] Synopsis of the Diseases of the Eye, p. 238; London, 1820.

[2] Philosophical Transactions, No. 164, or Lowthorp's Abridgment; Vol. iii; Part i. p. 40.

[3] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. x. p. 597; Berlin, 1827. See a Case in Sandifort's Observationes Anatomico-Pathologicae; Lib. iii. p. 74; Lugduni Batavorum, 1779.

SECTION XII.—POLYPUS OF THE LACRYMAL SAC.

Case 148.—A woman, aged 32, of delicate constitution, had for four years been subject to catarrh, whenever she exposed herself to cold. After some time, she became affected with a great degree of dryness of the eye, followed by inflammation extending from the Schneiderian membrane, along the nasal duct, to the lacrymal sac. The dacryocystitis being neglected, an erysipelatous inflamation of the lower lid and side of the face succeeded, with a large lacrymal tumour, which did not suppurate. The tumefaction of the lid and face went off, but a hard swelling remained in the lacrymal sac, on pressing which, puriform mucus was evacuated by the nostril and by the puncta. For three years, the pa-

tient suffered from relapses of the dacryocystitis, but the sac never suppurated. For six months, the sac could not, as formerly, be emptied by pressure, and the patient now felt with her finger a round hard tumour, distinct from the rest of the swelling. When she came under the care of Professor Walther, this tumour equalled in size a small filbert. It was round, moveable, hard, and not affected by compressing the sac. He suspected it to be a polypus.

On laying open the sac, a large quantity of puriform mucus, mixed with tears, was discharged. The polypus then came into view, it was laid hold of with a pair of forceps, drawn out, and its pedicle divided with the scissors. The nasal duct was found to be obstructed, and to restore it, a mesh was introduced, by means of which the patient was perfectly cured in three months.[1]

[1] Radius, Scriptores Ophthalmologici Minores; Vol. ii. p. 139; Lipsiæ, 1828. See a case of lacrymal polypus, related by Janin, in his Mémoires et Observations sur l'Œil, p. 299; Lyon, 1772.

CHAPTER VII.

DISEASES OF THE MUSCLES OF THE EYEBALL.

SECTION I.—INJURIES OF THE MUSCLES OF THE EYEBALL.

Injuries of the muscles of the eyeball are extremely rare. The obliqui are more exposed than the recti. In many cases of penetrating wound, the looseness of the orbital cellular membrane saves both the eyeball and its muscles. The recti are farther protected by their position behind the eyeball, while the branches of the third pair, by which they are supplied with nervous energy, enter their substance on their central surface, so as to be placed as much out of the way of injury as possible. Still it must occasionally happen, (in such wounds, for example, as have been described in the 1st Section of Chapter I.) that the muscles shall sustain more or less extensive injury; and the consequence will be a certain degree of impediment in the motions of the eyeball. Beer relates[1] the case of a medical student, in whom the abductor oculi appears to have been torn by a tobacco-pipe, thrust into the orbit.

The swelling and inflammation which almost immediately ensue on penetrating wounds of the orbit, added to the depth of the injured parts, will in general render it impossible to determine the amount, or perhaps even the reality, of injury done in such cases to the muscles. Nor is this of much consequence in a practical point of view; rest, soothing applications, and antiphlogistic means making up the treatment in all such cases.

[1] Lehre von den Augenkrankheiten, Vol. i. p. 146; Wien, 1813.

SECTION II.—PALSY OF THE MUSCLES OF THE EYEBALL.

I have already had occasion to refer (page 183) to the frequency of paralytic affections of the muscles supplied by the third nerve or motor oculi. We often have an opportunity of observing palsy of the rectus superior, inferior, and internus, accompanied by a similar affection of the levator palpebræ superioris, while the rectus externus retains its power, and turns the eyeball towards the temple. If with the finger we lift the upper lid in such a case, and tell the patient to look to the ground, we see that he attempts to do so, but is utterly unable to accomplish his intention. If we tell him to look upwards or inwards, he fails in both; and even when he endeavours to look straight forwards, the eye is scarcely, if at all, turned from its direction towards the temple. This state of immovable distortion is styled *luscitas*. We observe also that the pupil is dilated, and does not contract when exposed to bright light; for the iris, which receives its stimulus for motion from the third nerve, is involved in the paralytic affection.

In some rare cases it happens, that after the paralytic state of the muscles supplied by the third pair has continued for some time, the abductor also becomes palsied, so that the eye is no longer turned towards the temple, but looks directly forwards, and can be moved by no voluntary effort of the patient. We may conclude, in such circumstances, that the disease which originally caused pressure on the third nerve only, has extended so as to affect the sixth also.

When all motion of the eye is lost, from the palsied stage of the recti, the eyeball is apt to project unnaturally from the orbit, a state which is called *opthalmoptosis*,[1] and of which Sir Charles Bell records[2] an instance, combined with anæsthesia of the parts supplied by the fifth pair.

In some rare cases, we meet with palsy of the abductor only, so that the eye is turned inwards, and cannot be moved towards the temple. In one case of this sort, which I saw at the Glasgow Eye Infirmary, and which seemed of an apoplectic nature, the patient was affected with circumorbital pain, vertigo, and double vision.[3] Dr Yelloly has recorded a case of palsy of the left abductor, arising from the pressure of a tumour, lying on the pons Varolii, and extending to the left corpus pyramidale. The affection of the eye was attended with palsy of the right side of the body. The pupil retained its sensibility to light. A tumour in the fourth ventricle has also been known to produce palsy of the abductor.[4]

When the motions produced by the levator palpebræ, the rectus internus, superior and inferior oculi are partially or totally impeded, the movement inwards and upwards of the eyeball, which takes place when we wink, or close the eyes in sleep, and which is attributable to the action of the obliquus inferior, is evidently performed with difficulty, or is altogether lost.

We find, in most cases of palsy of the muscles of the eyeball, that

the fifth nerve and the portio dura continue to exercise their functions. The retina also retains its sentient power; but it generally happens, when the third is the nerve affected, that vision is somewhat indistinct, owing to the dilated and fixed state of the pupil.

Headach, vertigo, and double-vision generally attend attacks of palsy of the muscles of the eyeball. The stomach and bowels are also often deranged.

Causes. As has been already (page 183) mentioned, palsy of the muscles of the eye sometimes arises from exposure to cold, while in other cases it is owing to vascular congestion, sudden effusion, morbid growths, or slow disorganization within the cranium. These latter cases are sometimes consequent to blows or falls on the head.

In some cerebral cases, the symptoms come on slowly and insidiously, in others suddenly and to a great degree. At the commencement, as happens in other palsies, the symptoms sometimes come and go repeatedly.

Besides tumours pressing on the third and sixth pairs, effusions of coagulated lymph, surrounding the affected nerve, have been seen on dissection.[5]

Treatment. I have little to add to what has been said under this head at page 183. The same morbific causes being in operation, they must be combated by the same remedies. In rheumatic, and sudden cerebral cases, we are often successful by means of depletion, counter-irritation, sorbefaction, &c. while in the slow cerebral cases, we are too often but mere spectators of the loss of one function after another, till death closes the scene.

Electricity and Galvanism are of great service. In a case, arising from a fall from a horse, related[6] by Dr E. Gräfe, electro-puncture seemed useful. Magendie notices a case in his Lectures[7], in which a single application of electro-puncture produced a cure.

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[1] I have seen only one case of ophthalmoptosis, but it was not the result of palsy of the muscles of the eyeball. The patient was a cooper by trade, and was admitted at the Glasgow Eye Infirmary, for catarrho-rheumatic ophthalmia affecting chiefly the right eye. After he had attended for a few days, it was discovered that if he stooped forwards, although only for a few minutes, he felt as if something was filling or pressing above his right eye, which immediately began to protrude. On raising his head, the protrusion was very striking. In this state he saw indistinctly with the eye. It soon began to retire, and in a few minutes was in its natural place. He had the complete power of moving the eye, when in its natural situation, and moved it considerably even while it was displaced. The iris moved naturally. He complained of considerable pain in the orbit, which was relieved by venesection, and the use of mercurial purges. He stated that the protrusion of the eye commenced about five years before his application at the Eye Infirmary, after carrying a heavy load upon his back. It was difficult to assign any satisfactory explanation of the case.

[2] Nervous System of the Human Body. Appendix, p. cv; London, 1830.

[3] Medico-Chirurgical Transactions; Vol. i. p. 181; London, 1809.

[4] Ibid. p. 216.

[5] Bell, Op. Cit. p. xxxii, liii.

[6] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xii. p. 336; Berlin, 1828.

[7] Lancette Française, 6 Fev. 1836.

SECTION III.—WANT OF CORRESPONDENCE IN THE ACTION OF THE MUSCLES OF THE EYEBALLS.

§ 1. *Diplopia.*

In strabismus, there is an evident want of correspondence in the actions of the muscles of the eyeballs, and at the commencement of the complaint, there is double vision; but it would appear that double vision occasionally occurs with a degree of distortion of the eyes, so very slight, as scarcely to be observable. The double vision to which I now refer, takes its origin, at least in some cases, from over-exertion of the eyes, or, it may be, of one eye to the exclusion of the other. It is necessary to be aware of the existence of cases of this kind, lest we should confound them with those in which want of correspondence in the action of the muscles of the eyeball, and consequent double vision, are owing to disease of the encephalon.

Sir Everard Home, who first pointed out the practical importance of this distinction, has related two cases as illustrative of the symptoms and treatment of the subject of this section. The cases are interesting in several respects, although it must be confessed that there is no very conclusive evidence to prove that the symptoms were dependent merely on an affection of the muscles, and not on the state of the brain.

Case 149.—A lieutenant-colonel of engineers, who was in perfect health, shooting moor-game upon his estate in Scotland, was very much surprised, towards the evening of a fatiguing day's sport, to find all at once that every thing appeared double; his gun, his horse, and the road, were all double. This appearance distressed him exceedingly, and he became alarmed lest he should not find his way home; in this, however he succeeded, by giving the reins to his horse. After a night's rest, the double vision was much less; and in two or three days he went again to the moors, when his complaint returned in a more violent degree. He went to Edinburgh for the benefit of medical advice. The disease was referred to the eye itself, and treated accordingly; the head was shaved, blistered, and bled with leeches. He was put under a course of mercury, and kept upon a very spare diet. This plan was found to aggravate the symptoms; he, therefore, after giving it a sufficient trial, returned home in despair, and shut himself up in his own house. He gradually left off all medicine, and lived as usual. His sight was during the whole time perfectly clear, and near objects appeared single; but at three yards, they became double, and by increasing the distance, the two images separated farther from each other. When he looked at an object, it was perceived by a by-stander, that the two eyes were not equally directed to it. The complaint was most violent in the morning, and became better after dinner, when he had drunk a few glasses of wine. It continued for nearly a twelvemonth, and gradually went off.

Case 150.—A house-painter, who had worked a good deal in white lead, was admitted a patient into St George's Hospital, on account of fever attended with violent headach. Upon recovering from the fever, he was very much distressed at seeing every thing double; and as the fever was entirely gone, he was put under Sir Everard's care for this affection of his eyes. Upon inquiring into his complaints, Sir E. found them to correspond exactly with those of the former case, and therefore treated them as arising entirely from an affection of the muscles. He bound up one eye, and left the other open. The patient now saw

objects single, and very distinctly, but looking at them gave him pain in the eye, and brought on headach. This led Sir E. to believe that he had erroneously tied up the sound eye; the bandage was therefore removed to the other, and that which had been bound up was left open. He now saw objects without pain or the smallest uneasiness. He was thus kept with one eye confined for a week, after which the bandage was laid aside; the disease proved to be entirely gone, nor did it return in the smallest degree while he remained in the hospital. Rest alone had been sufficient to allow the muscles to recover their strength, and thus to produce a cure.

Sir Everard concludes by observing, that when muscles are strained or over-fatigued, the first object of attention is to put them in an easy state, and confine them from motion, and that this practice is no less applicable to the muscles of the eye, than to those of other parts.[1] Dr Young[2] remarks on this, that when one eye is diseased, it is by no means sufficient to cover this eye only, in order to give rest to its muscles, since these muscles unavoidably follow the motions of the sound eye.

§ 2. *Monoblepsis.*

Case 151.—I was sometime ago consulted by a gentleman, who, after spending a whole night in writing, was affected in the following manner: With either eye singly he saw quite well, but, owing to double vision, he could not use both eyes together, a symptom termed *monoblepsis*.[3] Whenever he looked downwards with both eyes he lost sight entirely of the objects before him, although he saw well enough when he looked upwards. He complained of vertigo, but had no headach. The symptoms slowly subsided after rest, bloodletting, blistering, purgatives, and mercury. They did not recur, although after some time, this patient had serious symptoms of disease within the head.

The following appears to be another case of the same sort:—

Case 152.—John Frost, carrier, aged 48, of a stout make, and rather plethoric habit, on his return from Exeter market, was seized with such a dimness of sight, that he could not discern any object at the distance of a few yards, and was unable to keep on the road without holding by the end of his cart, though it was only about 3 o'clock, P.M., and the day quite fine and clear. Before reaching his home, however, he found that on closing or covering either eye, he could see sufficiently well with the other. Mr Reed was called in next morning, and found that the patient could scarcely perceive even the lines of a book when both eyes were open, but that on closing either of them, he could read distinctly every word. These symptoms were accompanied with considerable pain in the forehead, and a full, quick, and rather hard pulse.

Mr Reed took blood from his arm, purged him with calomel and colocynth pills, and applied a blister to the back of his neck, but without producing any alteration on his sight. The pain of his head was gone; but he was still under the necessity of wearing a bandage over one eye, without which he could not see even to walk. Errhines, and a little sulphuric ether applied to the eyes, always afforded him temporary relief. There was not the slightest irregularity in the appearance or motions of the pupils, the humours appeared perfectly transparent, and no traces of inflammation could be perceived.[4]

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[1] Philosophical Transactions for 1797; Part I. p. 7.
[2] Introduction to Medical Literature, p. 99; London, 1823.
[3] From *μόνος single* and *ἔλιψις view.*
[4] Lancet for 1831–2; Vol. i. p. 167.

SECTION IV.—STRABISMUS.[1]

Symptoms. In strabismus, although the patient means to look at the same object with both eyes, one of them, moving involuntarily, and independently of the motions of the sound eye, turns away from its natural direction. If the sound eye be now closed, the other generally returns to the proper position, and so long as it is used alone, can be turned at the will of the patient in any direction he pleases. The instant, however, that the sound eye is again opened, the one affected with strabismus revolves inwards or outwards, and there it remains, not harmonizing in the movements of its fellow, or if it does move along with the sound eye, yet never so as to permit the two axes to be pointed at the same object. Hence the patient sees double, especially in the commencement of the disease; but after it has continued for a length of time, the double vision wears off, the impression on the squinting eye going for nothing.

The eye is much more frequently distorted inwards than outwards, the adductor seeming to overpower the abductor, or the obliqui overcoming the recti. When the eye turns inwards, the disease is termed *strabismus convergens*; when it turns outwards, *divergens*. In some individuals, we find the eyes squint alternately, or both together. In one case only have I seen strabismus directly upwards. The disease was congenital, and although the eye seemed natural when viewed by itself, it was considerably less than the other, and greatly deficient in sentient power. In a person recovering from amaurosis of the right eye, strabismus upwards and outwards came on in the left eye, without double vision or confusion of sight.

The vision of an eye that squints is almost always imperfect; and, of course, those who squint with both eyes, see indistinctly and confusedly. Those who squint inwards with both are generally very short-sighted, or partially amaurotic.

Causes. Whatever be the remote cause of strabismus, we cannot doubt that its proximate cause consists in some affection of the muscles of the eyeball. One or more of these must be in a condition rendering them incapable of their natural exercise. The muscular substance may be in a state of atony, or the nervous energy, which ought to animate the muscle, may be imperfectly supplied. In by far the greater number of cases, the eye rolls involuntarily inwards, which may lead us to conclude, that the abductor is in a state of unfitness for its office. It is not absolutely paralyzed, for on closing the sound eye, it evidently exerts its proper function, but from some cause to us unknown, as soon as the sound eye is again opened, the muscular force of the abductor is no longer able to support the eye in its natural direction, so that the distortion immediately returns. Even in those cases where one of the retinæ is imperfect, there must be some defect in the state of the moving powers of the eye. At the same time, it must be confessed, that in dissecting the muscles of a squinting eye, there is in general nothing unnatural observed in them or their attachments.[2]

Strabismus is connected with many remote causes.

1. Squinting is sometimes hereditary and congenital, three or four children in a family taking it from the father or mother. Dr Parry states,[3] that if the father or mother of a family squints, the majority of the children have the same defect. He asserts, however, that this does not commonly arise from hereditary defect, for that if taken while infants from their parents, they do not acquire the habit. They squint, he thinks, merely from imitation. This may fairly be doubted. I think it more probable that, in such instances, one eye is imperfect in sentient power, one of the muscular nerves defective, or one of the recti weak, from birth.

Dr John Clarke mentions[4] that he has known instances where children of squinting parents first showed a disposition to squint at nearly the same age as the parents had done, and this several years after birth, without any symptoms of oppressed brain having occurred.

2. Strabismus appears to take its origin, in many cases, from improper education of the eyes in young children. In all new-born children, there is a great mobility and restlessness of the eyes, an uncertainty with which they fix them on objects, and not unfrequently a degree even of strabismus. Their eyes must be educated to regular and harmonious movement, by exposing them equally to the light, and presenting to their view objects likely to fix their attention, neither too near nor at too great a distance, and much less in any unnatural direction.

The bad custom which nurses sometimes have of laying a child in such a position in its cradle, that it sees the light, or any other remarkable object, with one eye only, may give rise to a continued action of certain muscles, and corresponding inaction of their antagonists. Holding the child's toy near its eyes, or amusing it by suddenly presenting some favourite object close to its face, may cause squinting. Strabismus divergens is attributed to the improper practice of accustoming a child to look at the same time at two objects of which it is fond, but which are distant from one another.

3. Children occasionally become squinters from a fashion of looking at the point of their nose, or if there be any wart or spot upon it, by attempting frequently to inspect this deformity. They thus distort the eyes, and fall into the habit of doing so unconsciously.

4. Imitation has been accused as a cause of squinting.[5]

5. Squinting is frequently the result of ophthalmia and other affections which render the natural movements of the eye painful. Ophthalmia tarsi, or even a stye, has been observed to produce squinting in this way. Ulcer of the cornea, followed by a speck, is a frequent cause. We are in the habit of attributing the squint to the speck; but I believe the ulcer to be generally the true cause. A child finds, that by a particular effort of the muscles, he can so turn the eye as to ease the pain attending the friction of the ulcer in the natural movements of the organ. This effort is attended by a squint, and by frequently repeating this effort, or almost constantly

employing it for a time, a habitual strabismus is formed, which is often not detected till the ulcer is healed. In this case, we attribute it erroneously to the speck.

6. It is not at all unlikely, however, that a speck on the cornea may cause squinting. By turning the eye out of the natural axis of vision, the patient is able to see better past the speck. He is very apt so to turn the eye with the speck, if it happens to be the better eye of the two. In this way strabismus is not an unfrequent consequence of scrofulous ophthalmia.

7. Darwin was of opinion, that the most general cause of squinting in children was the custom of covering a weak eye, which had become diseased by any accidental cause, before the habit of observing objects with both eyes was perfectly established. In all cases of ophthalmia, both eyes should be shaded.

8. The most frequent cause of strabismus appears to be imperfect vision from short-sightedness, or from congenital defect of the retina. The distorted eye, in almost every case, is very considerably inferior in its power of sensation to the other. I use the words *very considerably*, because we meet with many individuals who have the eyes slightly unequal, who do not squint, and with others who have laboured from birth under complete, or almost complete amaurosis of one eye, and yet are quite free from strabismus. Buffon considered the inequality which produced strabismus as averaging 3-8ths. The impression, then, on the one eye, being considerably weaker than that on the other, is very liable to be neglected altogether, and the defective eye, instead of being fixed on the objects before it, is left to wander from the true axis of vision. There seems even to be an instinctive attempt, in some cases, still farther to distort the weak eye, and to turn it so far inward, and under the upper lid, that no impression can be received upon it, but that the sound eye only shall become the instrument of sensation.

9. Strabismus is sometimes attributed to spasm of one of the recti, and this spasm is supposed to arise from various causes; as, terror from a puncture of the eye, &c. I was consulted by the friends of a little boy, who became affected with strabismus immediately after squirting the oily juice of a piece of orange skin into his eye, which produced a great degree of pain.

10. Painful affections of the mind sometimes give rise to squinting. A fit of passion is a common cause of squinting in children. It probably acts by inducing a degree of apoplexy. Both eyes are often affected, but the one more than the other. A child has been known to squint for months after a violent fit of crying. A little boy awoke in the middle of the night on board a steam-boat; he was greatly alarmed, and soon after was observed to squint. In another boy, this affection appeared in consequence of forcibly bathing him in the sea, which was persevered in for some time, notwithstanding violent screams, and other expressions of terror.

11. Strabismus is induced by various diseases of the brain, as irritation, from costiveness, worms, teething, and the like; inflam-

mation; ramollissement; apoplexy; epilepsy; hydrocephalus; scrofulous tubercles; &c.

Sometimes squinting is the earliest sign of hydrocephalus. In this case, it is speedily followed by convulsions.

Scrofulous tubercles in the brain often give rise to squinting as their first symptom. On careful examination, the oculist will discover other signs of cerebral disease; such as, dropping of one or both upper eyelids; heaviness of the head; the head drawn to one side; partial loss of power in the limbs; difficulty in swallowing; difficulty in evacuating the fæces or urine, which are sometimes retained for days; and similar symptoms. By and by, the patient is perhaps affected with inability to close one or both eyes, one cheek is more flushed than the other, a peculiar stiffness is observed in the limbs formerly in a state approaching to palsy, there is difficult breathing, convulsions come on, followed by coma and death. On dissection, tubercles are found in the cerebellum, or in the neighbourhood of the pons Varolii, which have pressed upon the nerves, and induced an accumulation of water in the ventricles.

A young man, under the care of M. Guersent, squinted and had a speck on the cornea of the squinting eye, when he was seized with typhus fever, of which he died. Dr Cavarra[6] dissected the muscles of his eye with great care, their vessels, and their nerves, but found no appearance of the disease about any of them. The brain seemed healthy, except only that the lateral-external part of the crus cerebelli, on the same side as the strabismus, presented a loss of substance for some lines, exposing the medullary substance.[7]

Treatment. 1. Our first object in the treatment of strabismus, must be to discover the cause. When this is accomplished, the plan of cure will be obvious; or, perhaps, we shall find reason to consider the defect as irremediable.

2. As strabismus often arises in children from abdominal irritation, communicated perhaps through the great sympathetic to the orbital nerves, we ought at first to try the effect of an active purge or two; and then follow this up by mild aperients, and a carefully regulated diet. Squinting children are generally weakly and often scrofulous, so that a course of tonic medicine will probably be useful.

3. Strabismus is frequently observed in children to be connected with a careless employment of the eyes, which is instantly corrected by exciting their attention. In this case, Buffon's advice may be of advantage. Make the child look often in the glass. The child will see the squint, and correct it. This is an useful means of cure, when volition is sufficient, as it sometimes is, to prevent the squint. In other cases, the squint is never observed except when the child is in bad temper.

4. When only one eye squints, and when the defect in the sight of that eye is not very great, much may be done, by strengthening its muscles, to cure the strabismus. The strengthening of the muscles is effected chiefly by excluding the light from the sound

eye, and thus obliging the patient to exercise naturally the eye which squints. The light is best excluded by means of a small concave shade, covered with green silk. Whenever the sound eye is blindfolded, the weak eye recovers its natural position in the orbit, and its natural motions. The patient finds that the sight gradually improves by use; and though the strabismus does return, on again exposing the sound eye, especially after sleep, from the muscles having been inactive, yet it is not to the same extent, and day after day becomes less, if the plan of cure is continued.

The patient need not keep the sound eye covered during the whole day. At first, the shade may be worn for half an hour or an hour at a time, and then for longer periods. During the blindfolding of the sound eye, the weak one is to be exercised both on distant and near objects, but especially on the former. If the patient be a child, he must be encouraged to exercise the weak eye in playing at ball or shuttlecock, viewing extensive prospects in the country, reading books printed in a large type, looking at prints, &c. Many authorities might be produced in favour of the efficacy of this mode of cure. Beer[8] tells us, that by binding up the sound eye every day even for a couple of hours only, he had, in most cases, been successful.

It is worthy of remark, however, that this plan of curing strabismus is often attended by a diminished power both of motion and of vision in the sound eye; and that it has sometimes happened, that the squinting eye being cured by perseverance in this method, the sound eye has become distorted. If both eyes squint from the first, they must be blindfolded alternately, each for several days at a time.

Another method of exercising the weak eye is that recommended by Dr Smith.[9] Having placed the patient before us, we bid him close the good eye, and look at us with the one which squints. When we find the axis of this eye fixed directly upon us, we bid him endeavour to keep it in that situation, and open his good eye. Immediately, the squinting eye turns away from us towards the nose, and the axis of the other is pointed at us. But with patience and repeated trials, he will, by degrees, be able to keep the squinting eye fixed upon us, for some little time at least after the other is opened. When we have brought him to continue the axes of both eyes fixed upon us, as we stand directly before him, it will be time to change his position, and to set him first a little to one side of us and then to the other, and so to practise the same thing. When, in all these situations, he can perfectly and readily turn the axes of both eyes towards us, the cure is effected. An adult may practise all this in a mirror, without any director, though not so easily as with one.

5. As there is an inequality in the sensations of the sound and of the weak eye, it has been suggested that we should endeavour to put them more upon a par, and that this of itself would tend to correct the distortion. Buffon recommended, therefore, that the patient should wear a pair of spectacles with a plain glass opposite

to the bad eye, and a convex glass opposite to the good eye. In this way, the vision of the good eye would be rendered less distinct, and consequently it would be less in a state to act independently of the other.[10] As the weak eye is often short-sighted, the same advantage might perhaps be derived from placing a plain glass before the good eye, and a concave glass before the distorted one.

6. Dr Cavarra recommends electricity. He uses electro-puncture of the supra-orbitary and infra-orbitary nerves. With platina needles, the two branches are penetrated where they come out on the face, and then the ends of the needles are connected for an instant with the poles of a Galvanic pile. This being repeated six or seven times, the needles are withdrawn. This operation is to be repeated twice or thrice a-week. It is most successful in children, and is stated by Dr C. to be neither painful nor dangerous.[11]

7. The treatment of strabismus will, of course, be varied, according as the cause is more or less intimately connected with the muscles of the eyeball. A mere bad habit in the use of these muscles will probably be completely overcome by exercising the weak eye in the manner already described, and thereby strengthening the patient's volition over its motions. In cases of epicanthus, speck of the cornea, myopia, partial amaurosis, disease within the cranium, nervous irritation communicated from distant organs, means suited to these different causes must be adopted. In some cases, a certain degree of success, obtained by one plan, must be followed up by another of a totally different kind. Thus, Pellier relates[12] the case of a girl whose squint was occasioned by a speck on the cornea consequent to small-pox. By the use of stimulating drops, he removed the speck, but the strabismus remained the same. He then began a careful system of exercise, with the sound eye covered, and by this means effected a cure.

8. In cases of strabismus convergens, affecting both eyes, it is recommended that a pair of blinders, projecting in front of the temples, should be tried, during at least a portion of every day, with the view of attracting the eyes outwards; and that when the blinders are laid aside, a broad green shade should be worn. In most cases of squinting, a shade for both eyes is useful, or the employment of glasses of a pretty deep neutral tint.

Darwin[13] employed a different plan, and with considerable success, in the following case, which appears to have partaken of the nature of this strabismus.

Case 153.—The patient was a child, five years of age, exceedingly tractable and sensible. He viewed every object which was presented to him with but one eye at a time. If the object was presented on his right side, he viewed it with his left eye, and *vice versa*. He turned the pupil of that eye which was on the same side with the object, in such a direction that the image of the object might fall on that part of the bottom of the eye where the optic nerve enters it. When an object was held directly before him, he turned his head a little to one side, and observed it with but one eye, *viz.* with that most distant from the object, turning away the other in the manner above described; and when he became tired with observing it with that eye, he turned his head the contrary way, and observed it with the other eye alone, with equal facility; but never turned

the axes of both eyes on it at the same time. He saw and named letters, with equal ease, and at equal distances, with the one eye as with the other. There was no perceptible difference in the diameters of the irides, nor in their contractility after having covered his eyes from the light.

From these circumstances, Darwin was led at first to conclude that there was no defect in either eye,[14] but that the disease was simply a depraved habit of moving the eyes, probably occasioned by the form of a cap or head-dress, which might have been too prominent on the sides of his face, like bluffs used on coach-horses, and might, in early infancy, have made it more convenient for the child to view objects placed obliquely with the opposite eye, till by habit the adductores were become stronger, and more ready for motion than their antagonists.

Darwin recommended a paper gnomon to be made, and fixed to a cap. When this artificial nose was placed over his real nose, so as to project an inch between his eyes, the child, rather than turn his head so far to look at oblique objects, immediately began to view them with that eye which was next to them. This plan of cure was not persisted in; so that, six years after, Darwin found all the circumstances of this child's mode of vision exactly as they had been, except that they seemed established by longer habit, so that he could not bend the axes of both his eyes, on the same object, not even for a moment.

By Darwin's advice, a gnomon of thin brass was made to stand over his nose, with a half circle of the same metal to go round his temples. These were covered with black silk, and by means of a buckle behind his head, and a cross-piece over the vertex, this gnomon was worn without inconvenience, and projected before his nose about two inches and a half. By the intervention of this instrument, he soon found it more convenient to view oblique objects with the eye next to them, instead of the eye opposite to them. After his habit was weakened by a week's use of the gnomon, two bits of wood, about the size of a goose-quill, blackened all but a quarter of an inch at their summits, were frequently presented for him to look at, one being held on one side of the extremity of the gnomon, and the other on the other side. As he viewed these, they were gradually brought forwards beyond the gnomon, and then one was concealed behind the other. By this means, in another week, he could bend both his eyes on the same object for half a minute together. By the practice of this exercise, before a glass, almost every hour in the day, he became in another week able to read for a minute together, with his eyes both directed on the same objects. By perseverance in the use of the artificial nose, he acquired more and more the voluntary power of directing both eyes to the same object, particularly if the object was not more than four or five feet from him, so that Darwin anticipated a complete cure.

9. In strabismus divergens, affecting both eyes, alternate blindfolding of the eyes is as likely to be useful as in the strabismus convergens. It has also been advised to apply a piece of black plaister on the point of the nose, which may attract the patient's view, and correct the divergence.

Weller recommends[15] a short funnel, made of pasteboard, with an oval base, to be so applied as to include both eyes, and having, at that part which rests above the point of the nose, an opening about an inch in diameter. Through this instrument, fixed perfectly straight and firm, the patient must look, and by and by read. He is obliged, by this contrivance, when he wishes to see or read any thing, to turn the eyes inwards and downwards.

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[1] From στρέφω, *turn*.

[2] Cavarra, Journal Hebdomadaire des Progrès des Sciences Médicales, Tome i. 309; Paris, 1836.

[3] Collections from the unpublished Medical Writings of C. H. Parry, M.D. 571; London, 1825.

[4] Commentaries on some of the Diseases of Children; Part i. p. 127; London, 1815.

[5] Parry, Op. Cit. p. 572.

[6] Op. Cit. pp. 310, 311.

[7] Dr Cavarra mentions, that, if in a living animal, we divide the crus cerebelli, the animal immediately begins to squint. The division of the medullary part o the cerebellum, of the pons Varolii, or of the lateral part of the medulla oblongata produces the same effect. If instead of dividing, we compress the crus cerebelli of a living animal, strabismus, he says, is produced; and if the compression ceases, the eye recovers its natural powers of motion. The effect produced in such experiments is luscitas from palsy, not strabismus.

[8] Pflege gesunder und geschwächter Augen, p. 41; Frankfurt, 1802.

[9] Complete System of Opticks; Remarks, p. 31; Cambridge, 1738.

[10] Dissertation sur la Cause du Strabisme; Mémoires de l'Académie Royale des Sciences pour 1743, p. 338; 12mo; Amsterdam, 1748.

[11] Op. Cit. p. 312.

[12] Recueil de Mémoires et d'Observations, p. 410; Montpellier, 1783.

[13] Philosophical Transactions for 1778; Vol. lxvii. Part i. p. 86.

[14] From a series of experiments which he afterwards made, he came to the conclusion that the insensible spot at the bottom of this child's eye was four times the area of that in the eyes of others.

[15] Krankheiten des menschlichen Auges, p. 234; Berlin, 1819.

SECTION V.—LUSCITAS, OR IMMOVABLE DISTORTION OF THE EYEBALL.

The word *luscitas* has been used in various senses by authors on the diseases of the eye. Plenck employs[1] it as synonymous with oblique vision, or that state of the eyes in which the patient, seeing little or nothing when he looks directly forwards, perceives objects situated to one side, but without any distortion of the eye; while Beer understands[2] by luscitas, that the eye is turned to one or other side, and is there completely fixed, so that the patient is unable to move it. Luscitas, in this sense, is often confounded with strabismus; but in the latter affection, the patient is able to move the distorted eye, so as to direct it upon any object as soon as he closes the sound eye, while to effect the same purpose in luscitas, he must, as the eye is fixed, rotate the head.

Causes. Palsy of the rectus internus, attended generally by a similar affection of the rectus superior, rectus inferior, and levator palpebræ superioris, while the rectus externus retains its power, and rolls the eye outwards, is the most frequent cause of immovable distortion. Palsy of the abductor, again, will cause luscitas towards the nose. Affections of the brain, by paralyzing one or other of the recti, may cause luscitas. Thus, in chronic hydrocephalus, I have seen both eyes turned to the right, the patient having entirely lost the power of moving them to the left. Injuries of the muscles of the eyeball, or of their nerves, or matting together of the orbital cellular substance from inflammation, may produce luscitas; also, the pressure of tumours within the orbit, or a congenital deficiency of one of the recti.[3]

Prognosis. Luscitas is often incurable. The turning of the eye outwards or inwards, in palsy of the muscles, may cease, and the eye be again directed forwards, merely in consequence of the palsy extending to the rectus externus or internus. If the palsy be cured, not merely will the luscitas be removed, but the natural movements of the eye be restored.

Treatment. Except in cases of injury of the muscles, or their nerves, and of orbital tumours, the treatment of luscitas is that already recommended for palsy of the muscles of the eyeball.

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[1] Doctrina de Morbis Oculorum, p. 214; Viennæ, 1777.
[2] Lehre von den Augenkrankheiten; Vol. ii. p. 667; Wien, 1817.
[3] See Schön's Handbuch der pathologischen Anatomie des menschlichen Auges, p. 64; Hamburg, 1828.

SECTION VI.—TETANUS OCULI.

A fixed state of the eyeball, from tonic spasm of all, or several, of the recti, is styled tetanus oculi.

The state of the eyes and eyelids in trismus and tetanus merits greater attention than has been bestowed on it.

In a case of trismus related[1] by Mr Harkness, the patient, after stiffness in his jaw, which was the first symptom, felt stiffness and weight in the eyelids, which prevented him from opening them readily. He had also a slight degree of dimness, and a want of power over the ball of the eye, which remained, according to his sensations, fixed in his head, and was slightly drawn inwards. The eyelids were for three or four days much swoln.

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[1] Medico-Chirurgical Transactions; Vol. ii. p. 286; London, 1813.

SECTION VII.—OSCILLATION OF THE EYEBALL.

Symptoms. In oscillation, the eyeball is affected with an almost perpetual rotatory motion, round its antero-posterior axis. The patient is not conscious of this motion, from any particular feeling which he has in the eyes, nor can he restrain it. It goes on even when the lids are closed, but it ceases during sleep. The motion varies in extent, from a scarcely perceptible degree, to perhaps nearly a quadrant. In some cases, the motion seems to be rather from side to side, but often so small in degree and so rapid, that it is difficult to say what is exactly its direction. In general, it is pretty distinctly rotatory, and seems to be produced by the anta-

gonizing action of the obliqui, the recti having lost, in a great measure, their control over the eye.

Patients affected with partial amaurosis often complain of all objects appearing to them in a state of tremor. In such cases, we naturally expect to find the eyeballs oscillatory; but very often no oscillation can be detected, so that we are led to refer the apparent tremor to some peculiar morbid state of the retina or internal optic apparatus. On the other hand, those who are affected with oscillation, generally, though not always, make mention of an apparent unsteadiness and tremor of objects. I have known a patient with this disease complain of great deficiency of sight, from an apparent waving of all objects up and down. In another case, the oscillatory movement was very marked, so long as the eyes were directed towards any object, but when I held up the upper lid of one eye, and desired the patient to shut the other eye, the oscillation instantly and totally ceased, and the pupil turned up under the lid. To this patient all objects appeared tremulous, and from this cause, along with a degree of amaurosis, very indistinct. The pupils were large, and the aqueous humour superabundant. The case had all along been regarded as one of mere myopia.

Oscillation is often attended by short-sightedness, tremulousness of the iris, a sensation of weariness in the eyes, and sometimes by pain deep in the orbits, and in the head.

It is surprising how little, in some cases, oscillation disturbs vision. For instance, a girl of 17, whose case is recorded[1] by Sir Charles Bell, read with perfect ease, and yet there was no cessation of the motion of the eye. She threaded her needle, without any apparent difficulty, and then showed how she could sew, which was with the usual nimbleness. All objects seemed to this patient in their natural state of rest, or of motion. When she looked at herself in the glass, she saw her eye rapidly moving.

Causes. A congenital want of pigmentum nigrum, as in the albino, is generally attended by oscillation. We always observe this symptom in congenital cataract, and it becomes more marked as the patient advances in years; hence a reason for operating early in such cases. Oscillation frequently attends the partial amaurosis, which in many instances is consequent to deep-seated scrofulous inflammation of the eyeball. I have seen it, with alternating strabismus convergens of both eyes, follow ophthalmia neonatorum. Fatiguing employments of the sight always increase this unsteadiness of the eyes; while it generally subsides after a period of rest. In one instance, I observed oscillation of both eyes attendant on apoplexy, along with palsy of the left side of the body, diminished power of the right abductor oculi, and a degree of amaurosis. Dr Wallace mentions[2] a case in which an incessant motion of the eyes, resembling those of a child with congenital cataract, was brought on by overdosing with hydriodate of potash.

Treatment. Even in the most favourable cases of congenital cataract attended by oscillation, this symptom diminishes very

slowly after the pupils become clear, from the removal of the opaque lens. If partial amaurosis has accompanied the cataract, the oscillation continues unchanged. In cases of oscillation attending partial amaurosis, and accompanied by pain deep behind the eyes, the occasional application of leeches to the temple both relieves the pain, and lessens the oscillation. Rest of the eyes, and a course of tonic medicines, are indicated in most other cases of oscillation; but, it must be confessed, they are rarely productive of a permanent or complete cure.

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[1] Nervous System of the Human Body; Appendix, p. xlii.; London, 1830.
[2] Lancet, 26 March, 1836, p. 9.

SECTION VIII.—NYSTAGMUS.

This term is used to signify an involuntary motion of the eyeball from side to side. It is a clonic convulsion of the recti, symptomatic of various nervous diseases, as hysteria, epilepsy, chorea, &c. In a case of compressed brain, from effused blood, attendant on fractured skull, I saw this pendulum-like movement of the eyes continue for some hours before death. It went on uninterruptedly, even with the lids shut. Dr Bright[1] describes nystagmus as attendant on cerebral pressure, in a case of suffocation from the fumes of burning coals.

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[1] Report of Medical Cases; Vol. ii. p. 226; London, 1831.

CHAPTER VIII.

DISEASES OF THE ORBITAL CELLULAR MEMBRANE.

SECTION I.—INJURIES OF THE ORBITAL CELLULAR MEMBRANE.

Penetrating wounds, by the side of the eyeball, even when they do not appear to implicate any of the muscles or other important parts, are apt to be followed by severe phlegmonous inflammation, and even loss of sight.

Case 154.—Two children being at play, one of them shut himself up in a room, and excluded the other. Piqued at this, he who was without, took a stick about the thickness of a writing pen, and observing that he who was within the

room looked through a small hole in the door, drove the stick with such violence at him, that he buried it to the depth of two finger-breadths between the globe of the eye and the nose. The stick broke across; and as the mother did not know what had happened, a day or two passed without any thing being done, till swelling and inflammation of the eye and neighbouring parts supervening, medical advice was called in. The swelling was now so great, that it was with difficulty the bit of stick could be perceived, and it required great force to extract it with pincers. It had entered so much the more easily, as it was very slender at its extremity, and it was now swoln by remaining so long in the orbit.

The extraction being accomplished, the patient was twice bled, and soon recovered. The eyeball seemed to have suffered neither internally nor externally; yet it had entirely lost the power of vision.[1]

Case 155.—A soldier was wounded by a bayonet, which penetrated into the orbit without injuring the eye. The symptoms which ensued were trifling, until the patient contrived, three days afterwards, to absent himself for 24 hours, and get drunk. On his return, the eyeball was protruded, the lid could not be raised so as to expose the eye, which was highly inflamed; chemosis had taken place, vision was indistinct, the iris discoloured, the pupil contracted; the pain was excruciating both in the eye, which felt as if too large for the orbit, and all over the forehead and temple of that side; flashes of light of various colours darted through the eye, in consequence of the surrounding pressure. The swelling increased, delirium came on, and an abscess burst in the upper eyelid on the fourth day, without any alleviation of the symptoms. The patient soon afterwards became comatose, and died, probably from the formation of matter within the cranium. Before death, the eye had been lost by sloughing of the cornea.[2]

Foreign bodies penetrating into the orbital cellular substance, may lodge there for a great length of time, the conjunctiva sometimes healing over them, while in other cases, this membrane assumes a fungous appearance, and presents a sinuous opening communicating with the place occupied by the intruding substance.

Case 156.—A gentleman's horse, in hunting, came down when going over a hedge, and the rider fell into a stubble-field. Some sharp-pointed substance, whether a piece of the hedge or a straw, he could not tell, entered close to the caruncula lacrymalis, between the eye and the orbit. He thought he himself withdrew the whole of it at the time. Leeches were applied to subdue the inflammation. When he placed himself, three months afterwards, under the care of Dr Robertson, of Edinburgh, this gentleman found a number of small fungous granulations close to the caruncle, which the different practitioners, under whose care he had previously been, attempted to destroy by caustics, the knife, &c. There was also some discharge of purulent matter. On feeling minutely the parts, there appeared to be a sort of fibrous hardening, of the nature of that forming the sides of a fistulous passage, leading backwards to the posterior part of the orbit. Believing that there was some foreign body keeping up the discharge, and not being able by the probe to discover any passage, Dr Robertson made an incision in the hardened part. A piece of straw nearly an inch long was discharged, afterwards a second and a third portion, when the patient perfectly recovered.

M. Baudens relates[3] two cases of musket-balls lodging in the orbital cellular substance. Extraction of one of the balls was first attempted by making an incision through the lower eyelid, but this plan was abandoned, on account of the mobility of the ball. By pressing back the eye, drawing forward the lower lid, and introducing a curette behind the ball, it was at last extracted.

When amaurosis instantly follows a penetrating wound of the orbit, while the eyeball shows no appearance of having been injured, there is reason to suspect that the optic nerve has suffered. Thus, Dr Rognetta mentions[4] the case of a shoemaker, who became im-

mediately blind in consequence of being struck with an awl at the external orbital angle. He supposes the optic nerve to have been penetrated. The eyeball preserved its natural appearance.

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[1] Gendron, Traité des Maladies des Yeux; Tome i. p. 381; Paris, 1770.
[2] Guthrie's Lectures on the Operative Surgery of the Eye, p. 146; London, 1823.
[3] Clinique des Plaies d'Armes à Feu, p. 166; Paris, 1836.
[4] Cours Public d'Ophthalmologie; Lancette Française, 3 Dec. 1836.

SECTION II.—PHLEGMONOUS INFLAMMATION OF THE ORBITAL CELLULAR MEMBRANE.

It has already (page 121) been stated that erysipelatous inflammation sometimes spreads from the eyelids to the cellular substance of the orbit, and terminates there in diffuse abscess. The cellular membrane which envelops the muscles and nerves of the orbit, and by which the eyeball is supported, is also subject to acute phlegmonous inflammation, ending in suppuration, and forming one of the most severe and dangerous affections of the organ of vision.

Symptoms. During the *first*, or purely inflammatory *stage*, pain is felt, deep in the orbit, rapidly increasing in severity, and extending to the forehead and temple. The eye is soon observed to be more prominent than natural. The patient feels as if it were constantly pressed upon, or as if the orbit had become too small. The pain is greatly increased by touching the eye, or attempting to move it. The patient is distressed by the sensation of flashes of fire in the eye. Vision soon begins to fail, from the pressure exercised on the eyeball by the inflamed and tumefied parts by which it is surrounded, from the inflammation spreading to the optic nerve and its envelope, and from the nerve being put on the stretch by the projection of the eyeball forwards from the orbit. The conjunctiva becomes red and chemosed. In some cases the pupil is contracted and the eyeball partakes in the inflammation. This, however, is by no means constantly the case; matter may even form behind the eye, and yet its proper textures remain apparently uninjured. When they do inflame, the iris becomes discoloured and motionless. The secretion of tears is soon checked, from the lacrymal gland taking part in the inflammation, but till then there is epiphora. The eyelids are red, painful, and swoln, as if affected with erysipelas, and move with difficulty. The disease is apt to be mistaken for erysipelas of the lids, and nothing effectual being attempted, the patient may perish from deep-seated orbital abscess, inducing coma. The symptoms of inflammatory fever attend these local appearances. The pulse is hard, full, and frequent. The face is flushed. The patient is thirsty, his skin hot, he is restless, and often delirious, especially during the night. The inflammation may

extend to the membranes and substance of the brain, and then we have all the usual symptoms of phrenitis.

In the *second stage*, matter having formed behind, or to one side of the eyeball, this is still more protruded, and is more or less distorted. It is sometimes so much thrust out, as to project beyond the eyelids, pushing them aside, and presenting the displacement called *exophthalmos*. The matter generally presses forwards to the front of the orbit, and fluctuates behind the conjunctiva, or between the edge of the orbit and one or other eyelid. In some cases, there are several points of fluctuation; one perhaps under the conjunctiva, and another behind one or other eyelid. In one case, which I saw at the Glasgow Eye Infirmary, the matter burst through the conjunctiva, by the upper-inner side of the eyeball, and appeared as if coming from within the sclerotica, while another aperture formed through the upper eyelid, under the middle of the superciliary ridge. The eye was saved. If there is only one point of fluctuation, it is reasonable to conclude, that suppuration has taken place only on one side of the eye. The eyeball, in this case, is thrown forwards in an oblique direction. Not unfrequently the eyeball falls into the state of *exophthalmia*, that is, it is not only protruded, but at the same time destroyed by inflammation and suppuration. Matter is seen behind and in the substance of the cornea, which after a time bursts, and allows the humours to be evacuated. The photopsia continues, the delirium increases, the pain becomes more distinctly pulsative, and is of agonizing severity. Vision is totally destroyed. Even when the eyeball has not suffered much in texture from the inflammation, the retina is left in a state of insensibility. In some cases, apoplectic and fatal symptoms occur before the abscess is so much distended as to point externally. Rigors generally attend the second stage.

If this disease be neglected or mistreated, the inflammation may spread not only to the eyeball, but (See page 35) to the periosteum and bones of the orbit, or the matter may make its way into the nostril, the maxillary sinus, or even the cavity of the cranium.

Although, in general, inflammation of the orbital cellular membrane is an acute and rapid disease, it, in some cases, assumes a chronic form, so that, slowly and without pain, matter accumulates within the orbit. At length the lids become swoln, red and everted; the eyeball protrudes; fluctuation is felt; the abscess bursts, and leaves a sinus which is apt for a great length of time to discharge matter, even when there is no affection of the bones.

It sometimes happens, from the indurated and adherent state of the cellular membrane, consequent to orbital abscess, that the eyeball remains permanently protruded and motionless. In this case, the tears run over the cheek, the eyelids cannot close, the surface of the eye becomes inflamed and tender, and the patient continues subject to headach, watchfulness, fever, and great anxiety.[1]

Causes. The causes of inflammation within the orbit are confessed to be, in many cases, very obscure. Benedict tells us that this disease occurs for the most part in plethoric individuals, after

sudden changes of temperature, and in scrofulous or otherwise disordered constitutions. Foreign bodies thrust with violence between the edge of the orbit and the eyeball, and even slight injuries, occurring in peculiar constitutions, or under particular circumstances of the system, may bring on inflammation of the orbital cellular membrane. Thus, Weller instances a case which occurred in a healthy young woman, who happened, while in the state of menstruation, to receive a slight lacerated wound of the orbit. The fright occasioned by the injury brought on interruption of the menses, and a severe inflammation of the whole cavity of the orbit followed. The extirpation of orbital tumours sometimes gives rise to severe inflammation ending in suppuration. I have seen the same effects follow semi-extirpation of the eyeball for general choroid staphyloma.

Treatment. A vigorous antiphlogistic treatment must be had recourse to, in the first instance. Copious and repeated bleedings from the arm, a liberal application of leeches round the orbit, cold lotions to the head, free purging, abstinence, rest, and darkness, are evidently indicated. Even when the constitution is not robust, this sort of treatment must be followed, to save the vision, and, it may be, even the life of the patient. The debility arising from the use of active antiphlogistic means of cure may easily be removed, while a temporizing or timid plan of treatment may be productive of the most serious mischief. If the conjunctiva is chemosed, it should be freely scarified, or pieces of it cut out, which will procure a considerable flow of blood. Benedict recommends sinapisms to the neck, friction of the forehead and temple with mercurial ointment, and large doses of calomel internally.

An opening through the conjunctiva, or through the eyelid, for the evacuation of the matter collected within the orbit, is the chief point of the treatment in the second stage. A deep and free incision is to be made wherever the fluctuation is discovered; and even when there is no distinct fluctuation, if other symptoms are present which lead us to conclude that in all probability matter has formed, it is safer to plunge the lancet into the part which is swoln, and where we think suppuration is most likely to have taken place, than to allow the matter to accumulate, the bones perhaps to suffer, or even the brain to become affected. Of course, in opening the abscess, care must be taken to avoid the eyeball and other important parts. The incision ought to be kept open with a dossil of lint, and a poultice is afterwards to be applied. The eye is frequently to be fomented with decoction of poppies, or aqueous solution of opium. At the second or third dressing, after the abscess has been evacuated, the opening into the orbit may be cautiously examined with the probe. If it is not deep, the dossil of lint is gradually to be diminished in thickness, and pushed less into the orbit, till the sinus closes completely. If, on the other hand, the sinus, or sinuses are deep, running back almost to the bottom of the orbit, a mixture of tepid water and laudanum ought daily to be injected. This is

to be continued till the probe is found not to pass beyond the eyeball. The lint may be introduced to this depth, and is not to be lessened till the back part of the sinus close. I have already (Chapter I. Section ii.) explained the necessary treatment in cases where the bones of the orbit are found to be affected.

If the eyeball has suffered much, so that the aqueous chambers are distended with pus, it will be proper to open the cornea; but if only a small quantity of matter is lodged in the anterior chamber, or between the lamellæ of the cornea, we may rely on this being absorbed, if the general inflammation of the eye and orbit is subdued.

If the vision of the eye is completely gone, and a greenish purulent appearance remains behind the pupil, the lancet should be plunged through the sclerotica. Perhaps nothing but a little thin fluid will be evacuated, but after this is done, the eye retreats, and the life of the patient may be saved.

In four or five days after the orbital abscess is opened, all the dangerous symptoms have in general subsided, and the use of active antiphlogistic remedies may be laid aside. Easily digested food, in moderate quantities, may be allowed, and if the patient has been much weakened by the previous depletion, some such tonic may be given as is not apt to excite the vascular system.

When inflammation within the orbit assumes a chronic form, blisters to the temple and forehead are to be employed, with calomel internally till salivation is produced.

Cases. I have already stated (page 36) the principal circumstances of a case related by Saint-Yves, and of another by Demours, in which this disease ended in extensive caries of the orbit.

Mr Lawrence has related, with his usual clearness, two cases which fell under his care in an early stage of the complaint. "Some time ago," says he, "I saw two instances of this affection, in which the local and general symptoms were characterized by a degree of violence which I have hardly ever witnessed in any other case."

Case 157.—A man between 20 and 30 years of age, came to Mr Lawrence, accompanied by his wife, who said he had suffered such agonizing pain for the three or four preceding nights, that she was afraid he would have gone out of his mind. In this case matter was presented just under the superciliary ridge; after making a free opening, a large quantity was discharged, and upon putting in a probe, it went to the bottom of the orbit.

Case 158.—In a child between three and four years old, the local and general symptoms were equally severe; the matter presented between the lower lid and the globe, but the quantity which issued, on making an opening, was not very considerable in this case. In both instances the globe of the eye was very much protruded, but not actually thrust out between the eyelids, and after the matter was discharged it receded to its natural situation. In the child, vision was restored; but in the adult, the eye, although it had not been inflamed, remained amaurotic.[2]

Mr Ware remarks that if the suppuration be slow, and the matter lie considerably below the surface, the eye will be protruded before any fluctuation can be discovered, and the existence of the matter will only be learned by paying attention to the accompanying symptoms, such as a quick pulse, white tongue, shiverings, &c. These remarks he illustrates by the following case:—

Case 159.—In a child, six years old, Mr Ware passed a lancet on the side of the eye next the nose, a little below the commissure of the eyelids, at least an inch into the orbit, before he reached the matter. On withdrawing the instrument its point was evidently marked with pus. He therefore enlarged the aperture with a blunt-pointed bistoury, and discharged a considerable quantity which was thick and putrid. It was necessary to preserve the opening by the insertion of a small dossil of lint; on the removal of which, a vent was given daily to new matter for a fortnight. Its quantity gradually decreased, together with the prominence of the eye; and at length it wholly ceased, the wound healed, and the child became well. The motion of the affected eye, however, was not quite free towards the nose for several months afterwards.[3]

Case 160.—Mrs H. aged about 56, came under the care of Mr Espie, surgeon at Falkirk, on the 16th April 1836, for a disease in the right orbit. She stated that about 12 years before, she received a severe blow over the right eyebrow, by coming suddenly in contact with a lamp-post. After the lapse of four years from the date of the injury, one of her relations observed a difference in the appearance of her eyes, but she herself did not discover any thing particular about them for another period of four years, when she observed that the right eyeball protruded, without any other unpleasant symptom.

The protrusion gradually increased, and was attended with photopsia, double vision, dimness of sight, and much feeling of tension. She complained greatly of a feeling of traction within the orbit.

Mr Espie found the right eyeball protruding downwards and outwards. It appeared to rest on the orbitary edge of the malar bone. At the superior-internal part of the front of the orbit, he discovered a tumour, slightly elevated, and in which obscure fluctuation could be detected. The patient had not experienced any pain in the seat of the tumour. The eyelids, and particularly the upper, were much distended. There was no discolouration over the swelling. The patient had never experienced any rigors since the receipt of the injury. Her general health was good.

At this period, I saw the case, and advised that the tumour should be punctured, on the supposition that it was an encysted tumour.

On the 22d April, Mr Espie punctured the tumour at its most prominent part, and gave exit to a large quantity of pus, first flaky and then healthy. This was followed by immediate relief to the feelings of tension and traction. The double vision and other symptoms also vanished. The eyeball was gently returned, to a certain extent, into its socket, and a tent being introduced through the wound, a compress and roller were applied over the front of the orbit, so as to support the eyeball.

The case continued under treatment for about six months. During the greater part of that time, on introducing a director, matter continued to be discharged by the wound, and it was necessary repeatedly to dilate the opening. On one occasion of enlarging the wound, from its becoming fistulous, the eyeball was seized with an involuntary motion from side to side, which lasted fully an hour. On introducing a probe, which passed nearly to the bottom of the orbit, no carious bone could be detected. The eyeball was ultimately restored to nearly its natural place in the orbit, and the vision of the eye was perfectly preserved.

Case 161.—An unmarried woman, aged 25, was seized with most acute pain over all the left half of her head, under which she continued to suffer for nearly 15 days without seeking medical assistance. At length, when the eye began to turn red and to swell, assistance was called in. The cheek swelled to a great size, and presented a rose-red colour, becoming white on pressure. The patient was affected with fever, jactitation, and anxiety. On account of the swelling, and inflammation, the eyelids were so shut up, that the eyeball could not be uncovered. After some days, the swelling suppurated, and having burst spontaneously at the external angle of the eye, a great quantity of fœtid pus was discharged. On pressure, pus flowed not only from the cavity of the orbit, but from the parts surrounding the eye, and from the cheek. The swelling of the eyelids and neighbouring parts soon subsided, so that the eyeball could be seen. The conjunctiva was very red, and much chemosed; but the cornea appeared bright and clear. The pupil was dilated and the vision of the eye was lost.

On the fourth day after the bursting of the abscess, the patient was seized with

a violent nervous fit, which subsided into a complete loss of muscular power and sensation, with slow, irregular, and stertorous respiration, and a small, intermitting pulse, and was soon followed by death.

On dissection, it was found that the whole adipose and cellular tissue under the skin of the eyelids and cheeks even down to the lower jaw, was destroyed, and that in place of cellular substance, the space between the eyeball, its muscles, and the bottom of the orbit, was filled with very fœtid pus. The eyeball, and its contents, were quite healthy, and the cornea perfectly pellucid. On opening the cranium, the anterior lobe of the left hemisphere of the cerebrum, to the depth of the lateral ventricle, was in a great measure destroyed by suppuration. The suppuration surrounded the whole optic nerve, and communicated externally with the cavity of the orbit. The nerve itself had not suffered, either externally, or internally.[4]

Case 162.—J. S. a shoemaker, aged 27, robust, but of an irritable temperament, and given to drink, had one of the upper molar teeth on the left jaw extracted, on account of severe toothach. This was followed by swelling and redness of the left side of the face; and soon after there appeared, in the site of the extracted tooth, and under severe pain, a vesicle, of the size of a nut, clear like water. Ice-cold water, frequently taken into the mouth, gave relief; the pain subsided, the vesicle disappeared, and the swelling of the face became less. Some days afterwards, there was a profuse flow of tears from the left eye, which soon ceased, and was followed by a copious aqueous discharge from the left nostril. On the 17th April 1830, the epiphora was abundant, and attended by photophobia and by pressing, sometimes lancinating, pain in the head. Towards evening, the patient was seized with rigors, followed by heat; the photophobia and pain of the head became intolerable; the left half of the face, and the eyelids became suddenly much swoln, the swelling was tense, the eyeball motionless, and sharp burning tears ran down the cheeks. The patient slept none that night, and was occasionally troubled with photopsia.

Early on the 18th, the patient complained of weakness, with alternate feelings of heat and cold, and great thirst. The eyelids, and left cheek, were more swoln and tense; the photopsia constant; and the eye deprived of vision. Fomentations and other means were tried; but the symptoms increased in severity, and after another sleepless night, on account of the severe pulsative hemicrania, the patient applied for relief, on the 19th, at the Ophthalmological Clinic in Prague.

The symptoms were intense fever, with frequent, hard pulse; constipation for three days; the left eyelids enormously swoln, elastic, dark red, and extremely painful; the eyeball was fixed, but could not be exposed to view on account of the tenseness and swelling of the eyelids; constant photopsia; pulsating pain, almost insufferable, which concentrated itself chiefly in the eyeball, and was attended by a feeling of the eye being too big for the socket; the eyeball somewhat protruded; the edges of the eyelids glued together with yellowish tough mucus.

Professor Fischer bled the patient to the extent of 12 ounces, and put on 12 leeches round the eye, followed by a cold lotion, frequently renewed. Internally, a decoction of marshmallow roots, with nitre and tartrate of potash, was given in doses every two hours. The patient felt much relieved by the bloodletting and leeching, as well as by the cold application. In the evening, he seemed generally better, and had had one stool. The eye was in the same state as formerly, only the pain was less, but still pulsative. Twelve more leeches were applied, and the rest of the treatment continued. This night, the patient slept some hours.

20th. The pain in the eye had augmented, although the swelling was more confined to the eyelids, and less tense. The eyelids could with difficulty be separated from each other, so as to allow the chemosed conjunctiva to be seen; the cornea appeared natural, the pupil contracted and fixed. In the evening, the pain of the head and eye increasing, 15 leeches were applied.

During the two following days, the pain was less, and the patient had more rest during the night. The swelling of the upper eyelid affected more its inner extremity, without becoming soft or fluctuating. An emollient poultice was applied.

23d. Fluctuation being distinct at the inner angle of the eye, the abscess was

opened, and a large quantity of fœtid yellow-greenish matter was discharged. The swelling fell at the inner angle, but continued unchanged at the outer angle and in the lower eyelid. The eyelids could now be separated with less pain, permitting the cornea to be seen covered with puro-mucus, the conjunctiva bulbi swoln and fleshy, and folds of the palpebral conjunctiva protruding at the outer angle from between the eyelids.

The general health became much improved, the tongue clean, appetite natural, bowels rather slow. The pain in the left side of the head was sometimes severe, and at other times seemed entirely gone. The patient passed the nights pretty quietly, he slept, and felt refreshed. His mind was undisturbed. The swelling of the eyelids continued to decrease; the flow of matter was copious, and purulent shreds required often to be removed from the opening.

From the 1st till the 7th May, the patient complained only of a frequent and irresistible desire to sleep. The swelling of the lower eyelid continued; the eyeball became moveable; a prolapsus iridis had taken place through the cornea; the patient saw none with the eye. The great quantity of pus which flowed from the abscess, led to the suspicion that there was a collection of matter deep in the orbit. The patient was therefore advised to lie on the left side, or to sit with his head bent forwards, to aid the escape of the matter.

8th. Acid eructations, which ceased after the use of some effervescing powders.

9th. Somnolence; expression of countenance changed; he complained of a strong feeling of pressure in the left half of his head; retching, and vomiting of slimy bilious fluid; skin moist; pulse slow, soft, and full; swelling fallen; discharge diminished. It appeared probable that purulent effusion had taken place within the head. Two grains of calomel, with half a grain of digitalis, were ordered every two hours. Four hours after, convulsions of the right upper and lower extremities supervened, with stertorous respiration and insensibility. The dose of the powders was increased, mercurial ointment was rubbed upon the head, sinapisms were applied to the calves of the legs and soles of the feet, and clysters with tartar emetic were administered.

On the 10th, the patient died convulsed and apoplectic.

On dissection, the blood-vessels of the dura mater were found to be much distended, and the membrane itself, where it invested the anterior lobe of the left hemisphere of the brain, was extensively discoloured, being turned to a dirty grey. The pia mater, especially on the left side, was likewise strongly injected with blood. The left anterior lobe of the cerebrum contained in its interior a great collection of pus, communicating with the lateral ventricle which was partially filled with matter. The thalamus of the left side presented a greyish-brown colour, and soft pappy consistence; and of the same appearance was the inferior surface of the left anterior lobe. The substance of the cerebellum was softer than natural. The pons Varolii was entirely covered with matter, and its substance soft. The fourth ventricle was full of matter; the walls of the aqueduct of Sylvius were destroyed by suppuration; the corpora striata of a bluish-grey colour. At the basis of the brain, there were about 2 drachms of bloody serum.

On dissecting the eyeball, the sclerotica, choroid, lens, and vitreous body were found healthy. Even the optic nerve showed no remarkable disease. Of the muscles of the eye, only the rectus superior was involved in the process of suppuration. The roof of the orbit, to the extent of an inch in diameter, was of a bluish-grey colour, and so friable that the least pressure broke through it, and indeed in the middle of this space the bone was already penetrated, so that the cerebral abscess communicated there with the abscess in the orbit. The floor of the orbit was also of a bluish-grey colour, and drilled through, so that the probe passed into the antrum and to the back part of the soft palate. The antrum was full of matter, which had made its way through the body of the superior maxillary bone.[5]

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[1] Guthrie on the Operative Surgery of the Eye, p. 155; London, 1823.
[2] Lectures in the Lancet; Vol. ix. p. 500; London, 1826.
[3] Observations on the Treatment of the Epiphora, &c. p. 295. London, 1818.
[4] Burserius, Institutiones Medicinæ Practicæ; Vol. iii. p. 9; Lipsiæ, 1798.
[5] Fischer, Klinischer Unterricht in der Augenheilkunde; p. 9; Prag, 1832.

SECTION III.—INFILTRATION OF THE ORBITAL CELLULAR MEMBRANE.

There are recorded several very remarkable instances of exophthalmos, in which neither sanguineous effusion, inflammation of the orbital cellular membrane, nor any circumscribed orbital tumour appears to have existed. In some of the cases to which I refer, the exophthalmos yielded to the use of remedies, and although it is impossible to determine the exact nature of the cause to which the protrusion of the eye was owing, the facts are too valuable to be, on this account, passed over without notice. Saint-Yves entitles the chapter in which he narrates the three cases which I am about to quote, *Des Amas d'Humeurs qui se font derriere le Globe de l'Œil.* Mr Ware[1] speaks of similar instances of projection of the eye, as occasioned by a morbid accumulation of the substance on which the eye rests in the orbit, and tells us that the repeated application of leeches on the temple and forehead has been of great use in subduing the disease. In one case which came under his care, the projection was speedily diminished by opening the temporal artery, and after the bleeding ceased, converting the orifice into an issue. In another case, a perfect cure was accomplished by the application of a large caustic behind the ear. Cases 92 and 93 prove, by dissection, that the eye may be pushed from the socket, by a cause distinct from abscess, or circumscribed tumour. Inflammation of the periosteum of the orbit, terminating in thickening of that membrane, or of the bones (see case 58), might occasion symptoms similar to those produced by infiltration of the orbital cellular membrane, and might yield, perhaps, to the same remedies.

Case 163.—In the first case related by Saint-Yves, he supposed the fatty cellular substance behind the globe of the eye, as well as the lacrymal gland, to have been tumefied by the effusion of a viscid liquid. The eyeball was protruded at least three lines. Several surgeons who were consulted wished to extirpate the lacrymal gland, in the hope that the suppuration of the wound would lead to the replacement of the eye, and dissipate the swelling within the orbit. Saint-Yves objected to this proposal, being afraid lest the disease, which appeared to him of a scrofulous nature, might degenerate into cancer. He cured it perfectly by a three months' course of æthiops mineral.

Case 164.—The subject of Saint-Yves' second case was a young man, who came to Paris, with the globe of the eye inflamed, and extremely protruded. The eyelids, pressed by the globe against the edge of the orbit, were swoln, and the upper was even beginning to be livid, as if ready to fall into a state of gangrene. The patient attributed his complaint to a *coup de soleil*, which had been followed first of all by pain deep in the orbit, and then by protrusion of the eyeball. Saint-Yves concluded from the symptoms, that either there was an abscess behind the eye, or that the fatty cellular membrane of the orbit was tumefied by infiltration. Had he been certain that it was an abscess, he would have pushed a lancet through the orbicularis palpebrarum to the bottom of the orbit, but afraid of doing so without reason, he resolved to try the effect of a sorbefacient treatment. He ordered, therefore, 8 grains of calomel at night, with a dose of senna, manna, and jalap next morning; and in the meantime bled the patient from the external jugular vein. Finding that the first dose produced some good effect, he continued the calomel and the purgative mixture; and in a few days had the satisfaction of finding the exophthalmos completely removed.

Case 165.—Saint-Yves relates a third case, in which the symptoms were for a time alleviated by the use of remedies; but at length the pain growing insupportable, and totally preventing sleep, the eye at the same time becoming disorganized, he removed the contents of the orbit. Unfortunately he neglects to give any account of their appearance on dissection, although he speaks confidently of the cause of the protrusion, as *un amas d'humeurs visqueuses*.[2]

Case 166.—Louis quotes, from the *Medicina Septentrionalis* of Bonetus, the case of a girl, three years of age, whose right eye was almost entirely protruded from the orbit. Bonetus was asked whether a seton in the neck was likely to be useful. He observed that the child's clothes were much shorter before than behind, and this led him to examine the abdomen. He found it extremely tumid, tense, and hard. The child, in fact, presented the symptoms of tabes infantum. Bonetus thought that nothing could be done directly for the eye, but that the obstructed state of the bowels only should be attended to. After being purged, she was put on the use of tincture of rhubarb for a month. The exophthalmos gradually decreased as the abdomen fell; and by the time that the digestive organs were restored to a state of health, the eyeball had, without any other means of cure, recovered completely its natural situation.[3]

Case 167.—A man, aged 40, experienced for four or five days a racking pain in the right orbit, temple, and side of the head. When he came to the hospital, these symptoms were getting worse, attended with high fever, but no derangement of the intellectual functions. Active antiphlogistic treatment was resorted to for four days, without alleviation; at the end of which time, and in the course of one night, the eyelids became enormously tumid and red, which state extended for a certain distance to the temple and cheek; the eye was extremely protruded downwards and outwards, but vision not impaired.

It was thought the symptoms might be owing to an abscess in the orbit. An incision was accordingly made through the upper eyelid, but though first a scalpel, then a bistoury, were plunged very deep, no matter issued. A poultice was ordered, and next day, no pus having appeared, a bistoury, says Mr Hamilton, was swept nearly right round the eye, and so deep as almost to endanger the optic nerve. This was not more successful than the former operation; every symptom became aggravated, and on the fourth day the patient became stupid, and soon expired. His intellect and vision continued unimpaired till within the last few hours.

A post-mortem examination showed the swelling of the orbit to depend on the effusion of serum, no matter being discovered; but a circumscribed abscess existed in the right anterior lobe of the brain, the rest of the brain being healthy.[4]

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[1] Observations on the Treatment of the Epiphora, &c. p. 295; London, 1818.
[2] Nouveau Traité des Maladies des Yeux, p. 141; Paris, 1722.
[3] Mémoires de l'Académie Royale de Chirurgie; Tome xiii. p. 350; 12mo; Paris, 1774.
[4] Dublin Journal of Medical Science; Vol. ix. p. 262; Dublin, 1836.

SECTION IV.—SCIRRHUS OF THE ORBITAL CELLULAR MEMBRANE.

The cellular substance near the front of the orbit sometimes becomes hard, tuberculated, and actually scirrhous. Behind the eyeball, it has also been found in the same morbid condition.

Case 168.—A piece of limestone struck the outer edge of the orbit, producing a lacerated wound of no great extent, and which readily healed. Sometime after, a small hard swelling, formed at the site of the injury, was extirpated, and was found to contain a minute fragment of limestone. After some months, another

small tumour made its appearance in the same spot, and in connexion with it another, attached so firmly to the edge of the orbit, that it was taken for an exostosis. In a few weeks, a third circumscribed swelling was discovered running along the lower edge of the orbit, more moveable than that last mentioned, but as firm to the touch as a piece of cartilage. The patient was under the care of Mr Samuel Clarke, whom I assisted at the removal of the tumours. The two which felt so like exostoses, lay partly within the orbit, and adhered firmly to its periosteum. On making a section of them, they presented the white striated texture of scirrhus. The extirpation was accomplished after a semilunar incision, running parallel to the outer and lower edge of the orbit, and every particle of indurated substance was carefully removed. More than a year after the operation, there was no return of the disease.

Case 169.—A man, aged 36, was admitted into the *Hôpital de la Charité*, with the left eye in the state of exophthalmos. It projected half an inch beyond the edge of the orbit, and had completely lost the power of vision, without any change in its form or lustre. The disease had commenced two years before, but the sight of the eye, although constantly becoming weaker, had been totally extinguished only for two months. The patient saw quite well with the other eye.

Professor Roux judged the extirpation of the eye indispensable, and found that the disease consisted principally in a scirrhous affection of the cellular and adipose tissue of the orbit. The sclerotica appeared somewhat thicker and harder, and the vitreous humour more fluid and in greater quantity than natural. The optic nerve had been deprived of its functions only by the compression which it had undergone in the orbit.[1]

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[1] Revue Médicale ; Tome iv. p. 398 ; Paris, 1832.

CHAPTER IX.

ORBITAL TUMOURS.

SECTION I.—SARCOMATOUS AND ENCYSTED TUMOURS IN THE ORBIT.

Symptoms. WHATEVER be the nature of a morbid growth within the orbit, it necessarily gives rise to displacement, protrusion, and immobility of the eye, pressure on the eyeball and its nerves, so as to cause pain, and traction of the optic nerve, which, added to the pressure, brings on amaurosis. This last is often the earliest symptom which attracts attention. A great degree of deformity is produced by the unnatural position of the eyeball in such cases, even when it is not at all affected in structure. There is intolerance of light, the tears run over the cheek, the pain extends from the orbit to the temple and rest of the head, and at length the eye inflames, bursts, and is disorganized.

The sarcomatous tumours of the orbit are more or less of a firm consistence, and often very hard. They are less frequent, and grow

more slowly than the encysted tumours, but seldom reach so great a size. The contents of the encysted tumours are very various; sometimes limpid *(hygroma)* like white of egg, in other cases a thick bloody fluid, in others a substance like suet *(steatoma)*, pap *(atheroma)*, or honey *(meliceris)*.[1] Sometimes the cyst is thin and serous, in other cases thick and fibrous. Occasionally hairs are found growing from the internal surface of the cyst.

No part of the orbit is exempt from becoming the seat of tumours. They grow near the front of the cavity, so as from the first to advance before the eyeball. Their most frequent situation is below the eye and somewhat behind it. They grow above and behind the eye. Less frequently are they found by the nasal or temporal side of the orbit. In some cases, they have surrounded the optic nerve.

Their connexions are very different; sometimes loose, so that on exposing the tumour, it is easily separated and extracted, while in other cases it adheres firmly to the muscles and nerves, insinuates itself between these parts, involves the lacrymal gland, or adheres firmly to the eyeball, the optic nerve, or the walls of the orbit.

They have all a tendency to advance out of the cavity of the orbit, pushing on between its walls and the eyeball, pressing the eyeball forwards and to one side, projecting the eyelids or everting them, and elevating the conjunctiva. When considerably advanced, we are able to detect a degree of fluctuation in many of the encysted tumours, while the sarcomatous feel solid and resisting. The encysted are often so soft, that on pressure they seem to retire within the orbit, appearing again as soon as the pressure is removed. They are always more elastic to the touch than the sarcomatous tumours.

In some cases, a great degree of œdema of the eyelids comes on and obscures an orbital tumour previously distinctly felt, and even the opposite lids sometimes swell to a large size, as well as those covering the orbit in which the tumour is. Under such circumstances, we are obliged to judge a good deal from the previous history of the case, and the displacement of the eyeball.

It is a fact worthy of remark, that the pressure of a tumour within the orbit will sometimes dilate that cavity, or induce inflammation and caries of its walls, the eyeball continuing to resist the effects of the pressure. In this case matter is apt to collect, which, bursting through one of the eyelids, allows the probe to be passed into contact with the diseased bone, by the side of the tumour. A tumour in the orbit, if altogether left to itself, may extend to a very great size, and at length prove the occasion of the patient's death by pressure on the brain.

Causes. Blows on the edge of the orbit, and exposure to cold, are the causes most frequently referred to, in the cases of orbital tumours on record.

Encysted tumours of the orbit have been described as hydatids by Schmidt, Weldon, Delpech, and others. Hydatids do occur

occasionally in the orbit; but there is no good ground for believing that the tumours referred to by those authors, partook of the nature of entozoa.

Treatment. Leeches round the orbit, counter-irritation, and sorbefacient remedies, as iodine, both internally and externally, appear to be of little or no service in cases of orbital tumours. We are obliged, therefore, to have recourse either to the palliative cure of puncturing encysted tumours, or to partial or total extirpation. The last mentioned is the only means indeed which we can adopt, when the tumour is solid or sarcomatous. When an encysted tumour contains a fluid, puncturing the cyst always affords temporary relief, and in some instances has been followed by a radical cure.

1. *Puncture of encysted tumours.* Encysted tumours in different parts of the body, and especially in superficial situations, are apt to burst in consequence of blows, or at length give way simply from distension, and discharge their contents. The cyst remains for a time, and seems to operate like a foreign substance; inflammation comes on, ending in suppuration, and the cyst, especially if it be of the thin serous kind, either separately and entire, or along with the matter and broken down into shreds, is evacuated; after which the cavity, formerly occupied by the tumour, contracts and heals up. Upon this course, sometimes followed by nature, is founded the practice of puncturing encysted tumours, and evacuating their contents. It is not a practice to be much commended. It is tedious and uncertain; for the cyst may not come away for weeks or months, and if any portion of it is left behind, or, as is often the case, if the whole of it is left, a new collection of fluid is apt to take place. It may also happen in the orbit, as it has often happened in other parts of the body, that this practice of puncturing encysted tumours may produce great pain and irritation, and give rise to a fungous growth from the inside of the cyst, especially if its walls are thick and fibrous. The difficulty, however, on the one hand, of completely extirpating encysted tumours of the orbit, and on the other, the total subsidence of the swelling, and the return of the eye to its natural situation, after the contents of the cyst are evacuated, have occasionally led surgeons to content themselves with this palliative plan of treatment.

On puncturing encysted tumours in the orbit, an oily matter is not unfrequently discharged, very like pus; and hence tumours of this sort may sometimes have been mistaken for abscesses.

The following is an instance of the accidental bursting of an orbital encysted tumour:—

Case 170.—A lively girl, about 17 years of age, had a small opening at the temporal edge of the left orbit, close to the tarsus of the upper eyelid. Every morning she found the neighbourhood of this opening somewhat swoln, and by pressure evacuated through it a quantity of a whitish, pretty consistent, ropy substance, something like half-fluid tallow. The origin of her complaint was her suddenly leaping against a door, believing it to be open, when it was shut, and which she struck violently with the left side of her head. The part immediately became swoln and livid. Fomentations and poultices were employed, and the

immediate consequences of the contusion were removed. After some time, a small swelling made its appearance under the skin of the part which had been struck. This swelling increased, notwithstanding the use of embrocations and the like, and much disfigured the girl's countenance. It had acquired the size of a walnut, and a day was fixed for its extirpation, when she happened by accident again to strike her head against the same door so violently, that the cuticle was stript from off the part, and the tumour so much bruised that it suppurated. The abscess was opened, the cyst gave way, and a yellowish-white substance, like honey, was discharged, after which the wound contracted to the small opening, which existed when Dr Schwarz, the narrator of the case, saw the patient. He did not think it necessary to urge her to have the cyst removed by operation, as the inconvenience of emptying it from time to time was but trifling.[2]

In the two following cases, the puncturing of encysted tumours in the orbit, proved a radical cure.

Case 171.—*Cure by puncture and suppuration.* A shoemaker, aged 45 years, had the left eye prominent, and almost entirely out of its orbit. This exophthalmos had come on gradually, attended with pain, but without inflammation. The eye was pushed out by a hard tumour, which appeared to be situated between the globe and the inner wall of the orbit. Several practitioners in Paris were of opinion that the tumour was cancerous. The protruded eye was not enlarged, but was deprived of sight from compression and traction of the optic nerve. Richerand proposed to the patient to extirpate this suspected carcinoma, although from the renitency of the tumour he had his doubts concerning its nature. After having disunited the eyelids at their outer angle, and divided the conjunctiva, he thought proper, before going on with the operation, to assure himself of the real nature of the disease by plunging into it the point of his knife. This was followed by the exit of 2 or 3 ounces of a fluid similar to white of egg. Being now certain that the exophthalmos depended on an encysted tumour, and the eye having already, in consequence of the contraction of the cyst, retired partly into its natural place, Richerand renounced the idea of extirpation, and contented himself with applying wet compresses over the eye. Considerable inflammation followed, for which he bled the patient. The cyst suppurated, and the patient was cured after the excision of some excrescences formed by the conjunctiva.[3]

Case 172.—*Cyst discharged, after being punctured.* A woman was brought to Mr Weldon, with one of her eyes considerably protruded. About two years before, she felt a fulness of the eye, and a stiffness of the eyelids, so that they moved with difficulty. As these symptoms increased, she became sensible of a feeling of pressure and uneasiness in the ball of the eye, which gradually became painful, especially on moving it. At length the eye became immovable, and the pain increased to such a degree of violence, that the patient at times became delirious. When Mr W. saw her, the eye was considerably protruded forwards, and rather upwards, towards the inner angle. The eyelids were open and immovable, and there was a general fulness of the surrounding integuments. The sight had been lost about 12 months, and the iris was motionless. The blood-vessels of the eye were full and turgid. The pain she described as being intolerable, and almost without remission, extending at times over the whole head, but, in general, pretty much confined to the globe of the eye, and the situation of the optic nerve. It was attended by a sense of pressure and great distention. On feeling the integuments that covered the orbit beneath the eye, the sensation to the finger resembled that produced by feeling a loose fatty substance, but on examining the part more attentively, a deep-seated fluctuation was very evident. The parts were free from any tenderness or pain on pressure. With a cataract-knife, Mr W. made a puncture into the tumour, from the middle of the lower edge of the orbit, and pressed out a small quantity of transparent fluid. He then extended the wound for nearly an inch towards the outer canthus, taking care to keep the point of the knife sufficiently deep, and to carry it forwards at the same time, so as to open the cyst very freely. About two table-spoonfuls of a clear transparent fluid, slightly adhesive, came away. This was followed by instantaneous ease, while the eye sunk nearly into its natural place. The lips of the wound were kept asunder, and in five or six days, the cyst, which Mr

W. fancies to have been a hydatid, appeared in view, and was withdrawn. This coat, as Mr W. terms it, was spherical, rather thicker than the coats of hydatids of a corresponding size usually are, and had a smooth shining surface. The discharge gradually lessened, and the wound healed without farther trouble in the course of three weeks. The pain and affection of the head totally ceased, and the eye, to a common observer, appeared as the other. The iris remained motionless, and the sight totally lost.[4]

Case 173.—*Death after the operation of puncturing a cyst, which was prolonged through the foramen opticum into the cavity of the cranium.* Louis Bonnet, aged 20, from the time he was eight years of age, had a considerable tumour which filled the left orbit, and formed so large a projection between the eyelids, that they were kept separate from each other to the extent of an inch and a half. The intermediate space was covered by inflamed conjunctiva, scarcely any trace remained of the cornea, and the eye was atrophic. The tumour which distended the lids, and seemed to fill the orbit, was so placed between the muscles of the eye, that it was moved by their contractions as the eye naturally is. The renitency of the tumour showed it to be encysted.

The patient could say nothing of the cause of his disease. He recollected that in the commencement, he had pretty smart pain, for a month, in the bottom of the orbit, followed by gradual protrusion of the eyeball, that the vision became weaker and weaker as the eye protruded, and that the cornea ulcerated and burst, allowing the humours to escape.

It was easy to see that the cavity of the orbit had undergone an extraordinary degree of dilatation, so much so, as to change the form of the forehead, nose, and upper jaw. The opposite orbit seemed natural, the sight of the right eye perfect, the other senses and the intellect entire. The patient had no headach, and perceived no difference in the power of the two sides of his body. He suffered most from frequent conjunctival inflammation, and was earnestly desirous of a cure.

Delpech plunged a straight bistoury through the middle of the lower lid, the point where the tumour felt most renitent and fluctuating. A transparent, yellowish fluid was immediately ejected with great force. The quantity, also, was much more than Delpech had expected, even taking into account the enlarged size of the orbit. On passing his finger into the cavity of the tumour, he found, as he had anticipated, that the cyst was of the sero-mucous kind, and that it presented numerous irregular indurations; but what was his astonishment when he discovered that the cavity was prolonged into that of the cranium, through the foramen opticum, which was dilated to such a size as readily to admit his forefinger! Caddis was gently passed into the cavity of the cyst, and the edges of the wound kept separate by a fold of linen covered with cerate.

The patient suffered but little during the first two days; but on the 3d day, the symptoms announced inflammation of the brain and its membranes. Pain extended from the wound to the forehead and occiput; the features of the patient changed; and notwithstanding venesection, emollient fomentations of the head, and other remedies, he was very restless during the night, and somewhat delirious. Next day, his pulse was more frequent, with burning heat of skin. Twenty leeches were applied to each temple. On the 5th day he was insensible, and died in the evening.

The vessels of the brain were highly injected; the sub-arachnoid cellular tissue infiltrated and semi-opaque. In the lateral ventricles, there were about 3 ounces of milky serosity. All the lower surface of the brain, especially towards its left and anterior part, was soft and of a slate colour.

Opposite the internal temporal fossa of this side, and close to the sella Turcica, there was such an adhesion of the cerebral substance, that it was necessary to cut it in thin layers to separate it, and to discover the state of the parts. It was then perceived that the softening of the brain in almost its whole left anterior lobe had advanced to the state of purulency. A prolongation of the orbital cyst was found imbedded in the inferior surface of the same lobe, to the depth of nearly 3 inches, having pushed aside to that extent the pia mater and tunica arachnoidea. It was firmly adhering to these membranes. This prolongation presented, like the rest of the cyst, bosses and considerable inequalities of thickness in its parietes. It

structure was completely the same, its cavity contained the same purulent matter,

A Anterior cranial fossa of the right side.
B Right little wing of Ingrassias.
C Right foramen opticum.
D Right sphenoidal fissure.
E Left little wing of Ingrassias.
F Left sphenoidal fissure.
G Cranial portion of the encysted tumour.
H Orbitary portion of the encysted tumour.

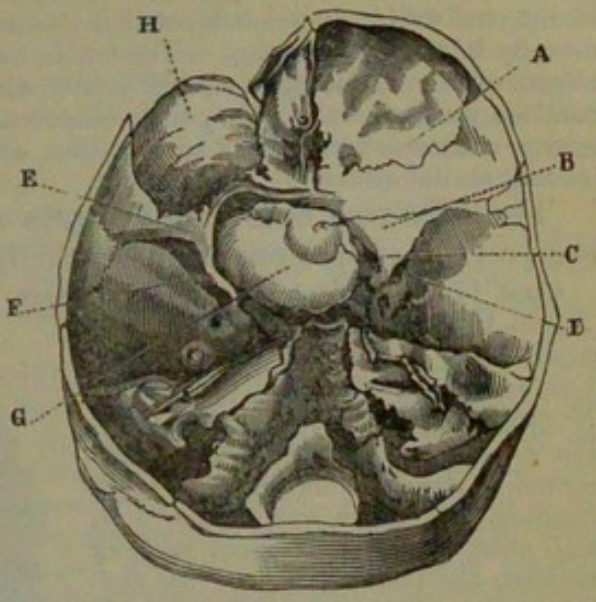

Fig. 38.

and in fact it was separated from the orbital portion merely by a sort of isthmus formed by the foramen opticum. This foramen presented a diameter of about $\frac{3}{4}$ of an inch, a change which it had evidently undergone while yet in a soft state. The left optic nerve had entirely disappeared in consequence of the pressure of the cyst.

On the inferior surface and in the substance of the right anterior lobe of the cerebrum was another sero-mucous cyst, similar to that on the left side, except that its cavity contained only pure serosity, and that it lay in the substance of the brain without pressing aside the pia mater and tunica arachnoidea. Its size was equal to half a pigeon's egg divided longitudinally. Round this cyst the brain was softened and of a slate colour, and the corresponding point of the meninges had suffered slightly from inflammation.[5]

2. *Partial extirpation of encysted tumours.* On account of the difficulty of removing the cyst in an entire state, and the danger of injuring important parts when the disease reaches deep into the orbit, surgeons sometimes have recourse to partial extirpation of encysted tumours in this situation. The front of the tumour being exposed in the usual way, the cyst is laid hold of with a pair of hooked forceps, or any other suitable instrument, and as much of it is removed as can conveniently be brought within the grasp of the scissors. The portion of the cyst which is left inflames, the external wound heals up more or less promptly, and in some cases there is no farther trouble experienced; but more frequently the wound opens repeatedly, till the cyst, destroyed by suppuration, is completely discharged.

Case 174.—*Anterior half of cyst removed, and posterior half touched with caustic.* Donald Mackinnes, aged 18 years, was admitted into the Glasgow Eye Infirmary, under the care of Dr Monteath, on the 28th of September 1827, on account of a soft tumour which, since infancy, had been observed to project from the right orbit, immediately above the tendon of the orbicularis palpebrarum. Its projecting part was as large as a middle-sized gooseberry, and as far as could be judged, the tumour dipped deep into the orbit. The eyeball was not displaced, nor did the patient experience any pain, but he was anxious to have the tumour removed on account of the deformity, which was very considerable. The integuments were divided and dissected back, and when the anterior half of the tumour

was thus exposed, it was laid hold of and excised. The cavity of the posterior half could now be distinctly seen, dipping nearly an inch into the orbit, close to its internal wall. It was evident that this part of the cyst could not be removed, even by laborious dissection. The whole cavity was therefore rubbed over with nitrate of silver, and then stuffed gently with lint, over which a compress and bandage were applied. Very little inflammation succeeded the operation. The cavity contracted from day to day, and was very soon completely obliterated, leaving no deformity.

The following case will illustrate some of the dangers attendant even on the simple operation of partial extirpation :—

Case 175.—*Violent inflammation after removal of anterior half of cyst.* Agnes Crawford, aged 14 years, was admitted a patient at the Glasgow Eye Infirmary, under the care of Dr Monteath, on the 24th October 1827. For six years, a tumour had been observed to project from the right orbit, pushing the upper eyelid before it, and most protuberant about midway between the tarsal border of the eyelid and the bony edge of the orbit. The greatest projection of the tumour was at the upper and inner part of the orbit, so that the eye was forced downwards and outwards. The part of the tumour which appeared externally was as large as a green gage plum, and from the very great displacement of the eyeball, it was concluded that the portion lying within the orbit was also large and extended deep. The skin covering the tumour, had a dirty livid colour. On partially everting the eyelids, the inferior part of the tumour was seen bulging through the conjunctiva. The girl suffered no pain. The vision of the eye was perfect, and the tunics free from inflammation. Though the eye was turned very much to the right side, she had no diplopia. She enjoyed good health. She had never menstruated. The tumour had been repeatedly punctured, and at one time a thread had been drawn through it and worn for some time, without producing either good or bad effects.

Fig. 39.

On the 28th of October, after low diet for three or four days, and two doses of laxative medicine, the patient was laid on a table, and an incision, nearly two inches long, made in the direction of the fibres of the orbicularis palpebrarum. The integuments were dissected back with a scalpel and a blunt silver knife, till more than the anterior half of the tumour was exposed. This was now cut away with the scissors. An immense discharge of fluid immediately took place from the sac, of the appearance of dark blood. This was followed by very considerable hæmorrhage from the bottom of the orbit. Dr M. thrust his finger to the bottom of the orbit, and by pressure soon stopped the violence of the bleeding Cold water was next injected for about a minute, by means of a syringe, deep into the orbit, which caused the bleeding to cease. Examination with the finger clearly demonstrated that the tumour had extended to the very bottom of the orbit, and even occupied there much space. It was therefore impossible to dissect out the posterior part of the cyst, so that it was merely stuffed moderately with a strip of lint. Another strip was placed between the lips of the external wound, to prevent adhesion. A compress was laid over all, and the eyes shaded. Before the patient had left the operation table, the eyeball had retreated very considerably into its natural position.

Next day, the whole of the upper eyelid was red and much swoln. The patient complained of headach, and her pulse was 112. Ten leeches were ordered round the orbit; after which, an emollient poultice was applied, and she had a dose o

castor oil. On the 3d day after the operation, the report states that the leeches had bled freely; but that the tumefaction having, upon the whole, increased, as well as the headach and fever, the tent of lint was withdrawn. She had suffered much during the night, the pain being pulsating and constant, both in the eye and head. In the morning, she had been seized with vomiting. The pulse was still above 100. The tumefaction was now so much increased, that the exophthalmos was greater than before the operation. The eyeball being chemosed, a portion of the swoln conjunctiva was snipped off. A probe was passed through the wound to the bottom of the orbit, but no retained blood nor pus was discharged. A small portion of sloughy matter, apparently part of the cyst, was extracted from the wound, at the mouth of which it presented. Twelve ounces of blood were taken from the arm at noon, and six more at 7 P.M. On both occasions she became faintish. The blood was buffy. The pulse fell a little, became softer, and she felt relieved. The poultice was continued, and she was ordered a dose of Epsom salts in divided quantities, which operated freely in the night, and disturbed her sleep. She had much less pain than during the previous night. Next day, the 4th after the operation, the pulse was about 90 and soft, the tumefaction of the eyelids, of a deep red colour, and very sensible to the touch, was increased to the bulk of the half of a middle-sized apple, the greater part of the swelling being formed of the upper eyelid; the chemosed conjunctiva projected from between the aperture of the lids; the cornea continued transparent, and vision was, as yet, good. Her thirst had been immoderate for the last three days, and still continued. She had frequent transient chills through the course of the day. Upon the whole, the pain of the eye and head were less than in the preceding day. She was ordered a draught, with 25 drops of laudanum, and the poultice was continued.

For two days, the tumefaction of the lids increased, particularly of the lower, which became so broad as to reach as low as the opening of the nostril. The swelling was indeed enormous, and the whole of it very tender to the touch. The cornea could with difficulty be seen, being overlapped by the chemosed conjunctiva. So far as it could be seen, it was transparent, but the pupil appeared enlarged, and she said she could not see.

From the 4th till the 8th day after the operation, the pulse varied from 75 to 90; the thirst gradually ceased; there was some return of appetite; and the headach and pain of the eye declined, so that by the 8th day they were nearly gone. The bowels were gently purged with Epsom salts, and she had an anodyne each night with much benefit. On the 7th and 8th days, the wound discharged matter pretty freely. Both eyelids had by this time become softer, and much less swoln. On the 8th day, it was observed that pus had made its way from the bottom of the orbit, through two apertures in the conjunctiva, where it is reflected from the lower eyelid to the eyeball, near the nasal canthus. For some days previously to this, the poultice had been discontinued, and the eyelids covered with lint smeared with simple ointment. The draught was now omitted. On the 28th of January 1828, the report states that the incision had been completely closed for some time, and that the eye had retired more into its proper situation. The pupil, however, continued dilated, and there was no return of vision. The patient was free from pain, and her general health was improving.

On the 8th of February, the eye was still more in its natural place, and its power of motion increased, but no renewal of vision. The patient now left the Infirmary for her home in the country, and in a few months died of phthisis pulmonalis.

3. *Total extirpation of encysted tumours.* The complete extirpation of an orbital encysted tumour is an operation almost always attended with considerable difficulty. The flow of blood, the danger of rupturing the cyst, the instant escape of its contents if it be accidentally torn or wounded, the almost complete impossibility of removing it in the collapsed state, and the great depth to which the cyst often extends within the orbit, are the circumstances which have led to the practices of puncture and partial extirpation. The total removal, however, of the cyst, is more satisfactory.

The operation is generally performed by making a transverse incision through the skin of one or other eyelid, parallel to the fibres of the orbicularis palpebrarum. This incision is not to be made freely, but cautiously, avoiding the lacrymal passages at the inner canthus, and taking care not to open the cyst, which is often almost immediately under the skin. The cellular substance beneath the orbicularis and the fibrous layer of the eyelids being next divided, the connexions of the cyst are to be separated. This is best effected by means of a pair of blunt forceps and a silver knife; with the former laying hold of the cyst, and with the latter destroying its cellular attachments. This being accomplished as completely round the cyst as possible, it is to be dragged forwards, and its posterior connexions divided with the knife or the scissors. The finger ought now to be introduced into the cavity left by the removal of the tumour, and an examination made, lest any indurated attachments or roots of the cyst have been left. These are to be laid hold of, and extirpated with the scissors. It is the general practice to fill the cavity formerly occupied by the tumour with lint, but this does not appear to be necessary. We may leave it filled with the blood which flows from the parts which we have divided. Its parietes will most probably inflame and suppurate, and then gradually contract; but by stuffing it with lint, the inflammation which follows is likely to be more severe and extensive, so that the contents of the orbit may suffer severely, the eye be prevented by the swelling and the matting together of the parts from retreating into its natural place, or even a new and permanent degree of protrusion of the eye be produced.

The following case, related by Saint-Yves, is frequently referred to, and appears to have served as an encouraging example of extirpation of an orbital tumour to several of his successors :—

Case 176.—*Encysted tumour with three cavities.* In a girl of 12 years of age, a tumour was situated below the eyeball, so that it turned the pupil upwards, and protruded the lower lid for more than half an inch. It extended towards the cheek for the breadth of an inch. Saint-Yves divided the skin and the orbicularis palpebrarum by a semilunar incision, extending the whole length of the tumour ; he then laid hold of it with a hook, separated it from its attachments with a bistoury, and removed it. With the scissors, he next cut away its root, which was hard and coriaceous. In 13 days, the wound was healed. The eye returned to its place, and the patient saw with it as with the other. The tumour presented three cavities. That which lay next the skin contained a purulent fluid ; the second was filled with a thicker matter, partly calcareous ; and the contents of the third resembled white of egg.[6]

Case 177.—*Tumour extirpated through the conjunctiva, after disunion of the eyelids.* A woman, about 40 years of age, was admitted a patient at the Surgical Hospital of Göttingen, with her left eye very prominent, and at the same time pressed upwards and inwards. The lower fold of the conjunctiva was protruded by a hard swelling, which pressed down the lower eyelid and surrounded the eyeball from the inner canthus to the outer, and hence to the upper edge of the orbit. This swelling was somewhat moveable, and could be surrounded by the fingers, so that no firm adhesions were to be expected. The protruded eye was of natural appearance, the pupil was regular, and the iris expanded and contracted, but there was no vision.

Professor Langenbeck began the operation by dividing the outer commissure of the eyelids and the conjunctiva. After both eyelids were separated from the

swelling, it was seen to be a steatomatous tumour, connected with the eyeball and its muscles. The separation from these parts was accomplished partly with the cutting edge of the scalpel, partly with its handle, and partly with the finger. The large opening left after the extirpation of the tumour was filled with charpie, till granulations appeared. The eyeball gradually retired within the orbit, and the power of vision returned so completely that the patient could distinguish the smallest object before she left the hospital. The deformity also was entirely removed.[7]

Case 178.—*Cyst evacuated, and then dissected out.* A laborious country-man was attacked with pain, and dimness of sight, in one of his eyes. These symptoms did not attract any particular attention for two or three years, when he became quite blind of the eye, the globe being at the same time greatly protruded, and the lower lid everted. Many surgeons who were consulted, dissuaded him from submitting to any operation, being apprehensive that his complaint, if not already cancerous, was likely to become so by meddling with it. He was therefore urged not to hazard the danger of any operation, seeing that his disease did not render life intolerable, but might be supported without farther inconvenience than the want of sight in the eye, and its unseemliness from being so far thrust out of its socket. He was recommended, however, to consult Mr Ingram, a surgeon in London, who, on carefully examining the case, imagined that he felt, on pressure, a resisting fluid under the eye, and formed the opinion that this fluid was contained in a cyst, detached from the lacrymal gland. He therefore gave encouragement to attempt the man's relief. Mr Bromfield approved of this proposal, and with Mr Ingram's assistance, performed the following operation.

He pressed upwards the distorted lower lid, till it was brought as near as possible to its natural position. While it was thus held tight, Mr B. cut through the integuments into the lower part of the orbit under the conjunctiva, till an aperture was made sufficient to permit the introduction of the finger, so as to direct a sharp-pointed scalpel, with which he perforated the tumour. Immediately, a thin pellucid liquor was discharged, not far short in quantity of a small wine glassful. Here Mr B. paused, to give the patient a little water to cleanse his mouth from the blood, and observed, that his business was not more than half done, until he should extract the cyst which had contained the water. He therefore introduced two small hooked instruments to catch hold of it, and took it completely out. The wound was filled with lint, and dry dressings, and these were secured by a proper bandage.

Within less than 24 hours, the patient's head and neck were swoln to a prodigious size. Treated as a common superficial wound, in less than a month the whole was healed, and the man sent home perfectly satisfied. Mr I. was all along, even before the operation, confident, that the overstretched muscles of the eye would, in time, recover their natural power, that the globe of the eye itself would consequently be included within its socket without leaving any outward blemish, and that even the sight would, to a certain degree, return. Dr Bracklesby, who relates the case, owns that he gave not much credit to all this, till five months after the man went home, when, being in the country, he sent for him to satisfy his curiosity. When he saw him, he scarce knew him again; for his eyelid had fully recovered its natural position and functions. About a month before Dr B. saw him, the eye began to be sensible of the difference between darkness and bright sunshine, and ever since that period its power of perception had become gradually strengthened.[8]

Case 179.—*Double cyst extending to bottom of orbit, and containing a tooth.* Thomas Heard, a healthy-looking lad of 17, was admitted an in-patient of the Exeter Eye Infirmary, under the care of Mr Barnes, on account of a tumour which completely obstructed the sight of his left eye. The tumour was situated beneath the eye, occupying a very considerable portion of the orbit; the eye in consequence was pushed into the upper part of that cavity, so as to be almost wholly hidden behind the upper lid. On tracing it backwards, the tumour appeared to extend to a very considerable depth, while it projected so much in front, as to constitute a striking deformity. Anteriorly it was rounded in form. A superficial groove, running obliquely across its upper surface, formed a slight line of division between the more prominent and moveable part of the swelling, and

that more immediately under the eyeball. The ciliary edge of the lower tarsus, with a few scattered hairs in it, crossed the front of the tumour rather above its middle; the conjunctiva, drawn forwards from the eyeball, greatly stretched, but apparently not much altered in structure, investing it above; and a thin skin of a deep red, loaded with purple vessels, covering it below; but neither of them closely adherent to it. The portion of the tumour in front was soft, and could be moulded into different shapes by the fingers; the posterior division felt more elastic. By an effort, the patient could raise the upper eyelid a little, but not high enough to discover even the lower edge of the cornea. By lifting it up with the finger, a portion of the pupil might be exposed, and he could then distinguish objects partially. The eye was apparently perfect, but he had scarcely any power of moving it. The swelling was first observed in early infancy, and was at that time not much larger than a pea. It increased but slowly, until about four or five years before his admission into the Infirmary, when it began evidently to enlarge, and for some time grew rapidly. More lately it had not advanced much. It caused no pain, but as it was a great deformity, was still enlarging, and by its presence rendered the eye useless, it was thought advisable to remove it.

In the operation, a division was made of the inferior oblique muscle of the eye, which appeared stretched across the front of the tumour, having been pushed before it, in its progress from the deeper parts of the orbit. The sac adhered firmly to the outer angle, and part of the lower edge of the orbit; in most other points, it was but loosely connected with the surrounding parts. It was found to extend almost to the bottom of the orbit, and to occupy more of it than did the eye itself. As it was impossible to proceed in the dissection far within that cavity, without greatly endangering the eye, on account of the very narrow space between it and the posterior division of the swelling, the contents of the latter were partially evacuated, to obtain room, and the sac cautiously separated from its deeper attachments. Towards the posterior point, on the inner side, and more than an inch from the edge of the orbit, the sac felt as if it embraced a sharp bony process, arising from about the line of junction between the ethmoid and superior maxillary bones. Unwilling to proceed at hazard, the operator cut off the cyst close up to this projection, that its nature and connexions might be examined before an attempt was made to remove it. It appeared to be formed of bone terminating in a sharp point, and projecting nearly in a perpendicular direction into the cavity of the orbit. It was slightly moveable, as if attached to the periosteum only; and was removed without much difficulty, together with the remains of the sac which adhered to it. On examination, it was found to be a tooth, resembling in form and size the supernumerary teeth sometimes found in the palate. The part which projected into the sac was conical, and covered by smooth, shining, white enamel; the sac firmly adhered round a contracted portion at the base of the cone, resembling the neck of a tooth; and without the sac, there was the appearance of a root, truncated obliquely, with a passage in the centre, evidently containing blood-vessels. It was by this part that it was connected with the floor of the orbit. The patient had a complete natural set of teeth, though many of them were disposed irregularly.

The extirpated tumour was found to be made up of two cysts, separable by dissection, at the groove already mentioned, to some depth all round, but indissolubly united in the centre. That in front allowed the colour of its contents to be distinguished through it. The posterior sac was thicker and more vascular. The interior surface of that in front was rough, with here and there a chalky matter adhering to it. It contained a compact lardaceous yellow substance. The inner surface of the posterior sac was smooth, excepting a part near the tooth, where it had much the appearance of coarse skin with many pores in it. The contents were partly a whey-coloured fluid, and partly a yellow curdy substance. The eye did not in the least drop on the removal of the tumour; and the large cavity which this had occupied, was filled with pieces of soft sponge, dipped in oil. On removing the last piece of sponge, on the 7th day after the operation, the cavity was found to be everywhere covered by healthy granulations. The opening contracted rapidly, and the eye sunk fast, so that within a fortnight it was nearly on a level with the other. The patient was discharged in the beginning of January, with the wound perfectly healed. The lower lid did not, at that

time, cover so much of the eyeball as it does naturally; and in one spot the ciliary edge was a little inverted. He had the power of moving it slightly, but he could not raise it high enough to bring it into accurate apposition with the upper. There was a considerable hollow above the eyeball; and the eye was not quite in a line with the other, but rather above it. He could not move it at all downwards, nor freely in any direction. With the exception of this inconvenience, he enjoyed with it perfect vision.[9]

Case 180.—*Encysted tumour in the orbit, complicated with symblepharon.* The eye of a man, 29 years of age, was pressed inwards and downwards by a tumour which occupied the upper and outer side of the orbit. The tumour fluctuated, and was very prominent. In consequence of previous inflammation, the cornea was opaque, and the eyelids were united to the eyeball. Professor Langenbeck divided the upper lid, over the tumour, which, as soon as it was laid bare, presented the appearance of a shining transparent cyst. He removed it perfectly entire. It was about the size of a pigeon's egg, and filled with fluid. The edges of the wound were brought together, and after it was healed, the morbid union of the lids to the ball of the eye was divided, so that the eye was restored to its natural place and power of motion.[10]

4. *Extirpation of sarcomatous tumours.* The extirpation of a solid tumour in the orbit may occasionally be effected by dividing merely the skin or the conjunctiva, according to the situation of the swelling, laying hold of the tumour with a hook or pair of hooked forceps, or passing a ligature through it, so as to drag it forwards, and dissecting it out with a small scalpel. In other cases, it is necessary, in order to effect the extirpation of the tumour with ease, first to disunite the eyelids by an incision, carried from their outer angle towards the temple. The conjunctiva covering the tumour is thus completely exposed, and all the remaining steps of the operation effected with less difficulty. When the tumour lies close to the bones of the orbit, and is perhaps adherent to the periosteum, the extirpation is more readily effected by cutting through the eyelid in a direction parallel to the fibres of the orbicularis palpebrarum, and along the edge of the orbit, leaving the conjunctiva untouched. A perpendicular division of the lid covering the tumour, has sometimes been had recourse to, but ought rather to be avoided. The tumour is to be extirpated, if possible, without injuring the parts in its neighbourhood, or to which it adheres. They are to be separated from it by cautious touches with the point of the scalpel, with a silver knife which serves to tear rather than cut, or with the finger-nail. But if the adhesions be inseparable, the parts to which the tumour adheres must be sacrificed. Even the eyeball will sometimes require to be removed. No portion of the tumour ought to be left, else the disease will be apt to be reproduced. After the tumour is extirpated, the displaced eyeball sometimes returns immediately to its natural situation, and recovers its power of motion; but in general this is effected not at once, but slowly, in the course of several weeks or even months, and may sometimes be assisted by the application of a compress and bandage. The removal of the pressure caused by the tumour is in some cases followed, more or less immediately, by restoration of the sight of the eye; while on the other hand, I have known the swelling and inflammation, subsequent to extirpation of an orbital tumour, produce for a time a

greater degree of displacement, than had previously existed, and a total loss of vision, in an eye with which, although much displaced, the patient had continued to see till the operation. The severe inflammation which sometimes follows the extirpation of an orbital tumour, may even extend to the brain or its membranes, and prove fatal.

Case 181.—*Tumour extirpated through an incision of the lower eyelid—Eyeball restored to its place by pressure.* One of the most interesting cases of sarcomatous orbital tumour is related by Dr Thomas Hope. The patient was a girl, 18 years of age, who, when about 11, began to have her left eye turned towards the temple, by a tumour betwixt the globe and the orbit. This tumour, for some years, did not appear outwardly; but, increasing by degrees, at last a hard swelling was perceived externally, reaching from the inner almost to the outer angle, under the lower eyelid, and half an inch down on the cheek. It forced the globe of the eye almost out of the socket, so that the pupil of that eye was, by measure, above $\frac{3}{4}$ths of an inch farther from the nose than the pupil of the other, while the eyeball was so prominent, that it seemed to be out upon the temple. It was quite immovable, but the sight, although a good deal impaired, was not lost. The patient had frequent pains in the head.

Dr Hope, having resolved to extirpate the tumour, made an incision about an inch long, beginning at the inner angle, and following the direction of the fibres of the orbicular muscle, towards the outer angle. He then passed a crooked needle, armed with silk, through the middle of the tumour as deep as he could go. By this means raising the tumour, he separated with a bistoury all its lateral adhesions, with the scissors cut the deeper attachments which he could not so well reach with the bistoury, and brought away all that the thread had hold of. This seemed to be a tough membranous substance, independent of the real tumour, which, after it was quite taken out, was found to be of a spherical figure, smooth and even, about the bigness of a small pigeon's egg. Dr H. passed the needle through the middle of it, as he had done before, and plunged a lancet into it as deep as he could, in order to let out any fluid matter that it might contain, but found nothing but a carnous substance. Lifting up the tumour by the thread, he cautiously dissected it, as far as he could, from the adjacent parts. In doing this, he found on the side next the eye several strong callous attachments, which felt almost as hard as cartilage, and obliged him to change two or three instruments. He then with the scissors, cut the inward adhesions at the roots, and brought the tumour away entire. On putting in his finger to the bottom of the orbit, he could feel several hard callous substances still remaining. Keeping his finger upon them, he hooked them with a crooked needle and ligature, and, making an assistant raise the thread, with the scissors he cut them away, so that he left the bottom even, and entirely free, as far as he could judge. All this while there was no great effusion from any artery, but a good deal of black grumous blood from the varicose vessels.

He dressed the wound with dry lint, which he removed on the 3d day, when he found a soft swelling in the eyelids and conjunctiva, with slight inflammation, and pain in the forehead. He applied a soft dossil dipt in common digestive and warm brandy, and ordered a warm fomentation every two hours. The pain in the forehead and the swelling continued for three or four days, without any appearance of matter. He then touched the bottom of the wound with lunar caustic. Some hours after, there followed a pretty large discharge of blackish blood, and immediately the head was relieved, and the swelling subsided. A bloody sanies continued to issue out the two following days, for which he injected warm water, with a little brandy and honey of roses, after which the wound began to heal up.

The eye still continued immovable. The abductor muscle had been so long contracted and the adductor overstretched, that they had lost their use. Dr H. observed, however, that by pressing gently with his hand upon the globe of the eye, he could bring it a good deal more into the socket, and that upon taking away his hand it returned to its former place. This made him think that a con-

stant and gradual pressure, by some proper bandage, might be of service to force the eye into its place, and keep it there till the muscles should recover their tone. Accordingly, he procured a steel bandage, with a concave brass plate corresponding to the convexity of the eye, and which, by means of a screw, bore upon the side of the eye next the temple. He applied this bandage, first gently forcing the eye more into its place with his hand, and then putting a thick soft compress betwixt the eye and the brass plate. He then screwed it down in such a manner that it was impossible for the eye to start back again as it used to do. An assistant was left with the patient all night, with instructions, if the bandage caused great pain, to ease the screw. By keeping the bandage constantly applied, day and night, and gradually increasing the pressure, in about 20 days the eye was brought entirely into its place, so as to remain there of itself, performing all its natural movements, and the patient seeing with that eye as well as with the other. In the morning, when the bandage was taken off, Dr H. could observe that side of the eye which the plate bore upon considerably flattened; yet this was not attended with any pain, or bad consequence.

In about a month, the wound was quite healed. A spongy carnosity had grown all along the inside of the lower eyelid, which, having been long overstretched by the tumour, was so relaxed, that, after the operation, it turned inside out; while the upper eyelid, having been very much extended for so many years by the globe, upon the eye returning to its place, was so relaxed, that its cartilage, on the contrary, turned inwards. For the cure of the ectropium of the lower lid, Dr H. passed a crooked needle through the middle of the carnosity, and raising it by the thread, cut it off with the scissors. He afterwards touched the inside of the lid with lunar caustic, in order to destroy what remained of the carnosity, and giving the eschar time to be thrown off, he repeated the same twice or thrice, by which the lid, in about a fortnight, recovered its proper situation. By topical applications, the upper eyelid recovered its strength, so that he did not find it necessary to operate for the entropium. Dr H. concludes his account of the case, by expressing his surprise how, after so great a degree of elongation of the optic nerve, for seven years, the patient's vision should, in a month's time, be so perfectly restored, and the muscles, after so long disuse, recover so soon their natural action.[11]

Case 182.—*Tumour extirpated through a perpendicular incision of the upper eyelid—Disease returns.* Dr Monteath shortly states the case of a young girl, who had a tumour on the upper and outer side of the orbit. In order to get at it, he was obliged to cut through the whole perpendicular length of the upper eyelid, and dissect back the two flaps. The tumour was nearly the size of a plum, and reached as far back as the eyeball. It was slightly encysted, perfectly organized, and of anomalous texture. The healing of the wound was rapid, and contrary to expectation, the eyelid reunited perfectly, and regained very nearly its natural power and extent of motion. The eyeball did so also, and the vision was perfect. The patient went to England some months after, and Dr M. was concerned to learn that the tumour had begun to grow again.[12]

Case 183.—*Tumour returns from not being completely extirpated—Operation rendered difficult by patient's resistance.* Mr Wardrop relates, that a young woman, of a robust form, had a tumour on the orbital plate of the left frontal bone, the base of which adhered firmly to the bone, whilst the exterior portion was attached to the integuments, in which there was a small sinus leading into the interior of the tumour. The diseased mass did not exceed the bulk of an almond, but it was attended with great pain, and even cautiously touching the orifice of the sinus with a probe excited violent irritation. A tumour had been extirpated from the seat of this swelling some months previously, a portion of which, adhering to the bone, being left behind, gave origin to this new growth. Though she had come from a distance, determined to get the disease removed by an operation, if it was considered advisable, yet when the scalpel touched the integuments, she made a violent resistance. A second attempt was made, she being previously secured on a table with numerous assistants; but such was the force and exertion she made to extricate herself, whenever the operation was about to be begun, that every hope of success was abandoned. It now occurred to Mr. W. as the only resource, that if she would allow herself to be bled to a state of

deliquium, the tumour might be extirpated while she remained insensible. After a few days, she submitted to this measure. A large vein was freely opened while she sat in the erect posture, in a very warm room, in which there were seven people, with the doors and windows kept shut to hasten her fainting. No less than 50 ounces of blood were drawn before she fainted, and then a complete state of syncope came on, which lasted a sufficient time to allow the tumour to be removed. The operation was accomplished with great facility; and in order to promote an exfoliation of the diseased portion of bone, its surface was rubbed over with kali purum. When the fainting went off, she would not believe that the operation had been performed, until she had examined her face in the glass. She suffered little from the effects of the operation; and though she remained pale and feeble for a few days from the profuse bleeding, yet in a week she was better than most patients are who have undergone so severe an operation.[13]

Case 184.—*Tumour encircling optic nerve—Eyeball extirpated.* A young adult woman consulted Dr Monteath on account of an orbital disease of two years' standing, which had produced hideous exophthalmos. It was found impracticable to extirpate the tumour without also removing the eyeball, which was accordingly done. The tumour exceeded the size of the eyeball, lay directly behind it, and so completely encircled the optic nerve, that the latter was diminished one half in thickness by the pressure. Vision had been rapidly declining previously to the operation. The tumour was exceedingly hard, of anomalous texture, and surrounded by a layer of condensed cellular substance. The auterior surface of the tumour touched and pressed upon the posterior surface of the eyeball, but had no connexion with it except through the medium of the optic nerve and cellular substance. Twenty months after the operation, the patient continued well.[14]

Case 185.—*Death from erysipelas, after extirpation of an orbital tumour.* Sir George Ballingall, in a clinical lecture delivered to the students of the Royal Infirmary of Edinburgh, in March 1828, and afterwards printed for their use, states that, on the 12th of November 1827, James M'Intosh was admitted with a soft moveable tumour impacted between the roof of the orbit and globe of the right eye, the superior eyelid was protruded outwards and considerably inflamed, as well as the conjunctiva covering the surface of the tumour; the ball of the eye was depressed by the swelling towards the cheek. The structure of the eye appeared perfectly sound, and the vision unimpaired, except in so far as it was partially obstructed by the projection of the tumour, which obliged the patient to throw back his head, and to elevate his face, in attempting to see objects placed before him. He was unconscious of any accident to which this complaint could be attributed, assigning its origin to exposure to cold in the month of January preceding. In July, he had been in the Infirmary, at which time the tumour occupied the site of the lacrymal gland, and was not above a fourth of the size it had attained in November. He was urged to have it removed, but would not consent, although told that he would, in all probability, return with it at a future period, when the operation would be more difficult. This accordingly happened; and in November he was solicitous for its removal.

The operation was begun by dividing the superior palpebra upwards and outwards from the external canthus. After dissecting the eyelid off from the surface of the swelling, the tumour was, with much difficulty, separated from the contiguous parts; a pedicle or neck, by which it was found adherent to the very bottom of the orbit, was then cut across with a pair of probe-pointed scissors, and some small portions of it afterwards removed.

The operation was followed, in the first instance, by a very moderate degree of swelling and inflammation, much less, indeed, than was to be anticipated. For nearly a week the case had a very favourable aspect, but, at the end of this time, the forehead and upper part of the face became involved in a violent erysipelatous inflammation, which gradually extended over the whole head, accompanied with delirium, the pulse rising as high as 150. It was observed, soon after the operation, that the patient's breath was imbued with the mercurial fœtor, which he attributed to some medicines taken before his admission. The urgent symptoms were somewhat alleviated by bleeding, both general and topical, by the internal exhibition of antimonials and saline purgatives, the application of a blister to the nape of the neck, with the use of an anodyne fomentation to the inflamed

parts. On the 22d, he was found to have sunk so low, that he was not expected to live through the ensuing night; his pulse 120, his breathing laborious, and his extremities cold, with low muttering typhoid delirium. From this state he again rallied under the use of brandy and water, beef tea, and the application of a second blister to the nape of the neck. A copious discharge of unhealthy matter had for some days been going on from the affected eye, the cornea of which now ulcerated, and, on the morning of the 27th, the crystalline lens was discharged through the opening. His delirium continued, with occasional intermissions, during which he asked for and devoured food with a ravenous appetite. His pulse continued frequent and weak, his breath fœtid and offensive, and his general appearance resembling that of a patient in the advanced stages of typhus. The cuticle separated in crusts from those parts of the head and face in which the inflammation had been seated; rigors and diarrhœa latterly supervened, and he expired on the evening of the 28th.

Permission could not be obtained to examine the body; but a hasty examination was made of the head and parts concerned in the operation. A portion of the principal tumour was found still adherent to the sheath of the optic nerve, and several small melanotic tubercles imbedded in the fatty matter surrounding the muscles of the eye. Some serous effusion had taken place both on the surface and into the ventricles of the brain. Sir George remarks, that if he had been fully aware of the nature of the disease, and of the deep attachment of the tumour, he should have proceeded at once to extirpate the whole contents of the orbit; but having succeeded in removing the bulk of the tumour with safety to the eyeball, he felt reluctant to change the plan of the operation. The inflammation immediately succeeding to the removal of the tumour, was much less than was to have been expected from so severe an operation, but when the symptoms of erysipelas supervened, it was obvious that the case became one of a very perplexing and hazardous description. The patient's system, surcharged with mercury, precluded the employment of mercurial purgatives, so often beneficial in erysipelatous inflammation, and it had been remarked, that, even when in the hospital in July, he had something of that sallow cachectic look often attendant upon internal organic disease, and which rendered him, in Sir George's estimation, an unfit subject for profuse evacuations of blood.[15]

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[1] On Encysted Tumours, consult Walther, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. iv. p. 386; Berlin, 1822. Lawrence, in Medico-Chirurgical Transactions; Vol. xvii. p. 43; London, 1832.

[2] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. vii. p. 235; Berlin, 1825.

[3] Nosographie Chirurgicale; Tome ii. p. 119; Paris, 1813.

[4] Cases and Observations in Surgery, p. 104; London, 1806.

[5] Delpech, Chirurgie Clinique de Montpellier; Tome ii. p. 505; Paris, 1828.

[6] Nouveau Traité des Maladies des Yeux, p. 147; Paris, 1722.

[7] Neue Bibliothek für die Chirurgie und Ophthalmologie; Vol. ii. p. 238; Hannover, 1819.

[8] Medical Observations and Inquiries; Vol. iv. p. 371; London, 1772.

[9] Medico-Chirurgical Transactions; Vol. iv. p. 316; London, 1813.

[10] Neue Bibliothek für die Chirurgie und Ophthalmologie; Vol. ii. p. 40; Hannover, 1819.

[11] Philosophical Transactions for 1744 and 1745; Vol. xliii. p. 194; London, 1748.

[12] Translation of Weller's Manuel; Vol. i. p. 195; Glasgow, 1821.

[13] Medico-Chirurgical Transactions; Vol. x. p. 275; London, 1819.

[14] Op. Cit. Vol. i. p. 196.

[15] On Orbital Tumours, see Acrel's Chirurgische Vorfälle, übersetzt von Murray; Vol. i. p. 88; Göttingen, 1777. Hedenus, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. ix. p. 267; Berlin, 1826. Delpech. Op. Cit. pp. 92, 99.

SECTION II.—FUNGUS HÆMATODES IN THE ORBIT.

Mr Travers tells us that the adipose tissue behind the eye is the frequent seat of fungus hæmatodes, or, as he terms it, medullary cancer. "An extraordinary globular tumour," says he, "is formed around the ball, of which the perished cornea forms the centre. It projects, stretching and so separating the lids, that they gird tightly the base of the enormous swelling. I have seen children subjects of this affection. The growth is sometimes confined to the upper or frontal aspect of the orbit. The upper lid is then prolonged and stretched over the globe so tightly that it is difficult, if practicable, to obtain a view of the latter. The medullary matter is of a granular or ricy consistence, and pervades and destroys the muscles, periosteum, and finally the bony vault of the orbit. I have seen its extirpation boldly performed; but its re-appearance has been almost immediate, and its progress quick to destruction."[1]

Fungus hæmatodes has been met with, affecting the substance of the optic nerve, while the eyeball remained sound,[2] and, in other cases, it has been seated within the sheath, which the optic nerve derives from the dura mater, the nerve itself not being affected;[3] but I know of no case on record corresponding to the general description given by Mr Travers.

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[1] Medico-Chirurgical Transactions; Vol. xv. p. 238; London, 1829.

[2] Wishart, Edinburgh Medical and Surgical Journal, Vol. xi. p. 274; Edinburgh, 1833.

[3] Panizza, Annotazioni Anatomico-chirurgiche sul Fungo Midollare dell' Occhio, pp. 106, 107; Tav. iii. fig. 1; Pavia, 1821.

SECTION III.—MELANOSIS IN THE ORBIT.

Case 186.—A fatal case of melanosis of the liver is recorded[1] by Chomel, in which the cellular membrane of the orbit was affected with the same disease. The right eye was inflamed, and projected remarkably from the orbit. An abscess occupied the lower third of the cornea, and the patient saw very obscurely with this eye, behind which there was found, on dissection, a round melanotic mass, about an inch in diameter. It seemed to be formed at the expense of the cellular membrane at the bottom of the orbit, and had displaced the optic nerve, without altering its texture.

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[1] Nouveau Journal de Médecine; Tome iii. p. 41; Paris, 1818.

SECTION IV.—OSSEOUS TUMOUR IN THE ORBIT.

Mr Lucas has related the following case of bony tumour, arising after an injury, and successfully extracted from the orbit:—

Case 187.—The patient was a farmer's daughter, 28 years of age. On the 25th of February 1802, she received a blow from a cow's horn on the upper and inner angle of the left orbit, nearly on the transverse suture. As the pain soon subsided, it was considered merely a slight contusion, and little attention was paid to it. About the beginning of March, there was discovered on the spot where the blow had been received, a small hard tumour, which gradually increased, with very little pain and no interruption to her general state of health, so that she continued her usual laborious employments about her father's house. On the 1st October, she consulted Mr L. who found, covered by the upper eyelid, a very hard tumour, of an oval form, and rather flat, somewhat more than an inch in its perpendicular diameter, and extending horizontally about an inch and a half in length, from the inner angle of the orbit towards the eyeball, which was displaced. The tumour seemed to occupy the greater part of the orbit, and had forced the eye forwards and outwards, so that it hung pendulous and loose, and apparently entirely beyond the exterior edge of the outer angle of the orbit. Mr L. concluded that the optic nerve and muscles must have been elongated nearly an inch. She could still discover objects with the eye, although its sight was much impaired. She complained of little pain, even when the tumour was pressed or handled pretty freely.

Mr Lucas resolved to ascertain the nature of the tumour, which, although hard, appeared somewhat loose. With this view he made a horizontal incision through the upper eyelid, about an inch in length, along the greater diameter of the tumour. On separating and raising the edges of the wound, the tumour was discovered to be a solid piece of bone, covered only by the common integuments, and a thin membrane somewhat resembling periosteum, to which the tumour was but slightly attached. No part of the bones of the orbit was denuded; and although the manner of the adhesion of the tumour to the surrounding parts could not be ascertained, it remained firm and immovable, notwithstanding considerable efforts to loosen it and bring it away. The wound made by the incision did not heal up, but continued nearly of its original size, discharging a small quantity of thin matter. The bone continued to increase in size, and the eye was still more pushed out of its natural position, although some degree of sight still remained. The patient continued in perfect health. At length, towards the end of September 1803, the bone becoming carious and evidently loose, and pushing somewhat forwards, Mr L. endeavoured to extract it, by making, with a small scalpel, an incision around the edges of the former wound, and then taking firm hold of it with a pair of strong forceps. The first attempt failed; but a second, made several days afterwards, succeeded. Mr L. extracted, without much exertion or difficulty, a piece of bone, of an oblong shape, weighing 1 ounce and 2 drachms, an inch and a half in length, and 2 inches $\frac{6}{8}$ths in circumference, hard, solid, and pretty smooth. The extraction of the bone was followed by no hæmorrhagy; a few drops of blood only were discharged from the edges of the wound. The cavity from which it was extracted was found to be lined with a strong membrane, quite smooth on the upper and inner sides, but somewhat uneven on the side next the ball of the eye. No perforation or communication with any of the surrounding parts could be discovered in it; when examined both with a probe and the finger, little irritation or pain was produced, and the tumour had evidently no connexion or adhesion with any bone adjoining to it.

In March 1805, when Mr L. published his account of the case, the wound was still open, and the cavity still extended in a straight direction backwards to 2 inches in depth. A little lint, covered by a bit of silk, hid the deformity. Every time the dressing was removed, the inside of the cavity was found to be covered with a slight exudation. The eyeball had in a great measure recovered its natural situation, and the sight of the eye had been completely restored.

The bone extracted in this case was particularly examined and analyzed by Dr Duncan, junior, who published two figures illustrating its external appearance and internal structure. Its shape he represents as extremely irregular, but somewhat resembling a wedge cut out of a sphere. The convex back of the edge, which was turned towards the middle line as it lay in the orbit, although extremely irregular and studded with processes, was in general smooth and polished. The sides were concave, and much less uneven, but in no part had a

smooth or polished surface. They resembled those points of bone to which cartilage, ligament, or membrane is firmly attached, being covered with small pits or depressions, and rough, as if corroded by the action of a caustic fluid. In no part, after the most careful examination, did it show any appearance of fracture, and therefore (concludes Dr D.) could not have been an exostosis. Its colour was yellowish-white; its sawdust snow-white. It was extremely hard. When cut, its internal structure was found to be nearly uniform, somewhat like that of ivory, being very slightly marked with the appearance of radii, extending from the middle of the edge to the convex back of the wedge. It admitted of being polished like ivory. In specific gravity and chemical composition, it scarcely differed from a piece of adult os femoris.[1]

[1] Edinburgh Medical and Surgical Journal; Vol. i. pp. 405, 407; Edinburgh, 1805.

CHAPTER X.

ORBITAL ANEURISMS.

SECTION I.—ANEURISM BY ANASTOMOSIS IN THE ORBIT.

The disease so admirably described by Mr John Bell under the name of *aneurism from anastomosis*, does not appear in every instance to arise from an original malformation, such as we observe in nævus maternus; but sometimes begins in apparently healthy adults, from sudden and hidden causes. Neither is it confined to the skin or subcutaneous cellular membrane, but affects indiscriminately all parts of the body, and brings on complicated morbid phenomena even among the viscera. Several cases are now recorded in which aneurism by anastomosis has arisen within the orbit, characterized by pain in the eye and head, a peculiar sensation compared to a snap or crack, followed by a whizzing noise in the head, blindness, protrusion and pulsation of the eye, and pulsatory or aneurismal swellings between the eye and the orbit. The instances which have occurred of this disease in the orbit have been too few, to permit us to describe from actual observation its ultimate effects and termination; but reasoning from the history of aneurisms by anastomosis in other parts of the body, we cannot doubt that the progress of the disease would be equally rapid in this situation, the bleedings, if the complaint were neglected, alarming and dangerous, and the issue fatal. It is probable that orbital aneurism by anastomosis will, like the same disease in other parts of the body, be sometimes passive or venous, and in other cases active or arterial.

I have already quoted (page 159) from Mr Abernethy, a case of nævus maternus of the upper eyelid, in which the disease extended

also into the orbit, and of which a cure was effected by the simple abstraction of heat, by means of folded linen, wet with a saturated solution of alum in rose water, and kept constantly applied over the tumour. This mode of treatment, however, and also that of pressure on the aneurism, are evidently quite inapplicable when this disease is situated deep within the orbit. To puncture an aneurism by anastomosis, and trust to the obliteration of the tumour by the pressure of the extravasated blood, a practice which in external nævi has succeeded, and which seems actually in one case of orbital aneurism by anastomosis to have been followed by a cure,[1] would also be altogether unwarrantable. Neither can excision be had recourse to in such a case, unless we resolve at once to remove the whole contents of the orbit; and even were the patient ready to submit to this operation, could we with safety attempt it, knowing, as we do from the recorded histories of many aneurisms by anastomosis, the innumerable sources from which such tumours are supplied with blood, the great dilatation which the neighbouring blood-vessels commonly present, and the difficulty which has often been experienced in arresting the hæmorrhage attendant on attempts to extirpate tumours of this nature? Dr Rognetta tells[2] us, he had twice seen Dupuytren extirpate the eye on account of aneurism by anastomosis in the orbit; but we cannot ground any conclusion on so vague a report.

The only other mode of treatment likely to impede the progress of an anastomotic aneurism within the orbit, is diminution of the force of the circulation through the tumour, by applying a ligature on the common carotid artery. We owe the first proof of the efficacy of this plan, not only in preventing the increase, but even in effecting the cure of this disease, to Mr Travers. His example has been followed by Mr Dalrymple of Norwich, who has published a second highly interesting example of the efficacy of the operation; while, still more recently, Mr Wardrop has demonstrated (see page 167) that similar good effects may be expected from tying the carotid, in cases of extensive nævus occupying the external parts of the face. The cases by Mr Travers and Mr Dalrymple are valuable, not only as proofs of the efficacy of the mode of treatment, but as illustrations of the origin, progress, and effects of the disease. I shall therefore quote them, almost without abridgment. At the same time, there is a suggestion made by Mr Hodgson,[3] which is worthy of notice, namely, that in similar cases it would be advisable to aid the process of cure, after the operation, by depletion and abstinence. In Mr Travers' patient, the diminution of the tumour was very remarkable after violent discharges of blood from the uterus. A very spare diet, and the avoidance of all violent exercise, in conjunction with repeated blood-letting, have been known to prove successful in the cure of carotid aneurism,[4] and the observance of a similar regimen must be highly proper after the application of a ligature on the carotid in any case of aneurism by anastomosis.

Case 188.—Frances Stoffell, aged 34, a healthy active woman, the mother of five children, on the evening of the 28th of December 1804, being some months advanced in pregnancy, felt a sudden snap on the left side of her forehead, attended with pain, and followed by a copious effusion of a limpid fluid into the cellular substance of the eyelids on the same side. For some days preceding, she had complained of a severe pain in the head, which was now increased to so great a degree, that for the space of a week she was unable to raise it from the pillow. The œdematous swelling surrounding the orbit was reduced by punctures; an issue was set in the temple for a smart attack of ophthalmia which supervened, and leeches and cold washes were applied. She now first perceived a protrusion of the globe of the eye, with dimness of sight, and the appearance of a circumscribed tumour, elastic to the touch, and as large as a hazel-nut, upon the infra-orbitary ridge. Another softer and more diffused swelling arose at the same time above the tendon of the orbicularis palpebrarum. The lower tumour communicated both to the sight and the touch, the pulse of the larger arteries; the upper gave the sensation of a strong vibratory thrill. The swellings grew slowly, and the skin between the eyes, as well as that of the lower eyelid, became puffed and thickened. The globe of the eye was gradually forced upwards and outwards, and its motions considerably impeded. She had a constant noise in her head, which, to her sensation, exactly resembled the blowing of a pair of bellows. The pulsatory motion of the tumours was much increased by agitation of mind, or strong exercise of body, but the most distressing of her symptoms was a cold obtuse pain in the crown of the head, occasionally shooting across the forehead and temples. She was compelled to rest the left side of her head on her hand when in the recumbent posture, and found the beating and noise to increase sensibly when her head was low and unsupported.

Such was the substance of the patient's report, when Mr Travers was requested to see her. He found the skin in the region of the orbits morbidly thick and wrinkled, the eyebrow of the diseased side pushed two or three lines above the level of the opposite one, and the hollow of the orbit lost from the elevation of the globe of the eye. The upper half of the inner canthus was filled by the thrilling tumour, which afforded a loose woolly sensation to the touch, was very compressible, and when firmly pressed, was felt slightly to pulsate. The veins of the upper lid and on the sides of the nose were varicose, and the skin was much pursed over the lacrymal sac. The lower tumour, which projected above the infra-orbitary foramen, was of a conical shape, firm, but elastic to the touch. It could be emptied, or pressed back into the orbit, but the pulsation then became violent; and from the increased pressure of the globe upon the roof and side of the orbit, the pain was insupportable. Careful compression of the temporal, angular, and maxillary arteries, produced no effect on the aneurism. Upon applying the thumb to the trunk of the common carotid, Mr T. found the pulsation to cease altogether, and the whiz of the little swelling to be rendered so exceedingly faint, that it was difficult to determine whether it continued or not. The recent increase of puffiness in the skin over the root of the nose, and below the inner angle of the opposite eye, had given alarm to the patient and her friends, who feared, not without some appearance of reason, a similar affection of the right orbit.

Mr Travers felt persuaded that this disease could be no other than aneurism by anastomosis. Indeed, it bore so strong a resemblance in its principal features to several of Mr John Bell's cases, and in particular to that communicated[5] by Mr Freer, of Birmingham, whose patient, refusing assistance, expired of hæmorrhage, that Mr T. considered the sensible growth of the disease an argument of sufficient force to justify any rational attempt to repress it. From the character of similar cases, and the idea which he had formed of this, it was to be expected that although it had been slow in its formation, it would be rapid in its increase; and unlike the aneurism of trunks, would resist control as it acquired size. He first tried the effect of pressure, but, although moderate, it could be borne only for a limited time, by reason of the pain attending the exasperated action of the arteries. Cold applications had been already made use of without any evident advantage; but indeed the duration and aspect of the disease made this remedy appear trifling. Excision, the only method, of which in similar cases, experience has

confirmed the success, was clearly impracticable without extirpation of the eye; and from the great displacement of the globe, and the obvious origin of the disease within the orbit, Mr T. considered the result of such an operation to be most precarious. Being satisfied of the increase of the disease, knowing from the happy precedent of Sir Astley Cooper's first case of carotid aneurism, the perfect practicability, and, under favourable circumstances, the moderate risk of placing a ligature on the carotid artery, and particularly reflecting that the obstruction of such a channel, must, at all events, be followed by a sensible and permanent diminution of the impulse of blood destined to the disease, Mr T. tied the carotid on the 23d of May 1809.

After exposing the artery, a curved eyed probe, carrying a stout round ligature, was passed beneath it, and upon compressing the vessel with the finger, as it lay over the probe, the pulsation of the lower tumour immediately ceased. The probe being cut away, the ligatures were drawn apart from each other, and tied. Before she quitted the table, the patient observed that the pain was benumbed, and that the noise in her head had entirely ceased. The small tumour over the angle of the eye was still thrilling, but very obscurely. The ligatures came away on the 21st and 22d days. Few symptoms of general irritation followed the operation. By the 5th day, the pulse which had risen to 130, fell to 84; her headach had subsided; and she felt comfortable in every respect.

The following are the principal changes which succeeded the operation. In the evening of the same day, the lower tumour had already acquired the thrilling motion of the upper. On the 3d day, the tingling or thrilling sensation was experienced in both tumours, upon light contact of the finger; if firmly compressed, a pulse was perceived in the lower. On the 5th day, the tumours were very considerably diminished, the eye less prominent; the globe of the eye communicated a slight pulsation; her sight was short, and objects appeared to her larger than natural, and misty. On the 21st day, she found no inconvenience from sitting up, and working all day, and was astonished to find that she could read small print, and do fine work with her right or sound eye, which she had been unable to do for years. By the end of the 5th week, she could perform all the duties of her situation as well as before the operation, and expressed herself well satisfied with the obvious diminution of the tumour, the decrease of the pulsation, and the total freedom she enjoyed from pain, which had distracted her for years. Four months after the operation, the tumours were evidently smaller, and their motion materially diminished; the eye was less projecting; the cold dull pain, formerly uninterrupted, was now but rarely felt; the artery of the left side was distinguished beating very feebly below the angle of the jaw, while the carotid of the opposite side contracted with more than ordinary force.

On the 28th of October, she miscarried at the period of about 10 weeks after conception. The hæmorrhage was so considerable as to induce syncope, and left her in a state of extreme debility. On the succeeding morning, it was observed that the upper tumour was flattened, and the pulsation had altogether ceased. On the 30th, she felt pain in the affected side of the head, and was feverish. In the course of a few hours the cellular substance of the orbit was filled with a serous fluid, precisely as at the commencement of the disease. The pain was relieved, and the œdematous swelling, and heat of the surface, were reduced by a cold lotion. In the course of November, the pain in her head had entirely subsided, but owing to her extreme debility from loss of blood, she was subject to occasional palpitation of the heart, and giddiness. The upper tumour, and the folds of the integuments between the eyebrows had totally disappeared. The eye projected less; the lower tumour was inelastic, and had no preternatural pulsation. In May 1811, a knob, of the size of a large pea, over the inner angle of the eye, was the only vestige that remained of the disease.[6]

Nearly five years after the operation, Mr Hodgson had an opportunity of examining the patient. She was then in perfect health, and the cure of the aneurism so complete, that it was impossible to discover that disease had existed in the orbit.[7]

Case 189.—On the 24th of November 1812, Dinah Field, aged 44 years, of a delicate and sickly habit of body, came to Mr Dalrymple, of Norwich, with a

complaint in the left eye. She said, that about five months before, being then pregnant of her sixth child, she was seized in the middle of the night, with an intense pain in the left eyeball, accompanied by a whizzing noise in the head, which grievously distressed her. The attack was instantaneously sudden. Hearing a noise, as of the cracking of a whip, and feeling at the same moment an extraordinary kind of pain in the globe of the left eye, she awoke in great alarm, and leaped out of bed. About 10 or 12 hours afterwards, the eye became inflamed, and the eyelids so much swelled, as to project considerably beyond the level of the upper and lower orbitary ridge. She also felt acute pain over the whole of the left side of the head; while in the left eyebrow, and at the bottom of the orbit, her anguish was scarcely to be borne. In the succeeding night, the extreme violence of the pain abated, but the swelling of the eyelid seemed rather to increase; and she thought she felt as if the globe of the eye was forcibly drawn up towards her forehead.

No particular alteration took place in the next seven weeks, at the end of which time she was delivered. During her labour, which she said was very severe, there was projected between the eyelids a bright red tumour of an oblong form, which, for seven or eight days, gradually enlarged, until it occupied, in a vertical direction, almost the whole space between the superciliary ridge and the lower edge of the ala nasi, reaching horizontally from the external angle of the left eye, across the root of the nose, to nearly the internal canthus of the right eye. In the course of her confinement, this tumour was punctured, in several places, by a surgeon who then attended her. It bled freely, became smaller, and assumed a strikingly darker colour. A week afterwards, it was again punctured, and with similar results; and although the operation was repeated four other times, the latter incisions afforded no relief. About two months previously to the appearance of this swelling, the patient lost all power over the levator muscle of the upper eyelid; but if the swelling was depressed, and the lid raised, she could see as well as ever. She soon, however, became totally blind on this side.

Three or four months after Mr D. first saw her, he found that her general health had sensibly declined, and that the local affection, now marked by very decided characters, was distinctly aneurismal. She had constant and acute pain, referred chiefly to the bottom of the orbit; but her severest suffering was occasioned by the increasing noise in her head, which she compared to the rippling of water, and which became absolutely insupportable, when, by any accident, her head fell below a certain level. The left eyeball was immovable, and either enlarged, or thrust with so much force against the upper eyelid, as to cause this part to project in a convex form, considerably beyond the superciliary and infra-orbitary ridges. The eyebrow, also, of the affected side, rose somewhat above the level of the other. The external surface of the tumid eyelid was, for the most part, soft and elastic to the touch, but its cuticle was remarkably coarse, as was, indeed, the texture of the skin generally in the vicinity of the orbit. Deep-seated within the integuments of the eyelid, a little towards the inner canthus, there was a cluster of small tumours, of a firm and dense structure, causing great pain when compressed, and communicating to the finger a pulsatory thrill. Interposed between this cluster and the lower edge of the eyebrow, precisely in the course of the frontal branch of the ophthalmic artery, there was a hard tubercular substance, which rose somewhat higher above the general surface of the eyelid, and pulsated still more distinctly than the smaller swellings. The texture of this substance was particularly hard and compact, and the slightest pressure upon it occasioned intolerable pain. The lower eyelid was everted, and formed a bright and red convex tumour, following in its outline the direction of the inferior edge of the orbit, and reaching from the external commissure of the eyelids to a little way beyond the tendon of the orbicularis. At its upper part it was covered by an overlapping of the upper eyelid, which was paralytic, and entirely concealed the globe of the eye. The most depending part of this tumour reached to within a line of the infra-orbitary foramen. Like the tumours at the upper part of the orbit, this swelling communicated to the touch an aneurismal thrill. Its pulsation became evident to the sight whenever the force of the circulation was increased. In addition to these appearances, immediately above the nasal third of the superciliary ridge, the integuments were gently elevated into a soft

ill-defined tumour, occupying very exactly the situation of certain branches of the frontal artery, and pulsating simultaneously with the artery at the wrist. A similar elevation of the skin was perceptible at the root of the nose, giving a faint tremulous motion to a finger placed upon it.

When the globe of the eye was uncovered, it appeared at first to be enlarged, but a closer inspection showed it to be forcibly thrust forwards, in a direction somewhat outwards and inwards. A multitude of enlarged vessels could be traced from the surface of the lower tumour to that portion of the conjunctiva which covers the sclerotica. The cornea retained its natural lustre and transparency, but there was a total loss of power in the iris, and the pupil, much dilated, was slightly irregular. Behind the lens a fawn-coloured appearance was observed, similar to that represented in the second plate of Mr Saunders's posthumous work. The cutaneous veins were very full of blood, and gave to the skin of the left side of the face the complexion of a person strangled. When strong pressure was made upon the common carotid artery, the tremulous motions of the tumour, situated at the lower part of the orbit, ceased entirely, but the pulsations of the upper swellings continued in some degree. The force of the stroke was, indeed, much weakened, but no pressure which the patient was able to bear, could entirely suppress it.

At noon, on the 7th of April 1813, Mr D. tied the common trunk of the left carotid artery. The effects of the operation were immediate and decisive. As soon as the ligatures were tied, the pulsatory motions of the tumours on the forehead and cheek entirely ceased; but a slight thrilling was still perceptible in the tumid upper eyelid. The red swelling of the lower eyelid became paler, and its surface shrivelled. A few minutes after the patient was placed in bed, she was quite free from pain, and the noise by which she had been so long tormented having also ceased, she declared that her head no longer felt *like her old head*. At 5, P.M. there was no pulsation in any of the tumours. Next day the upper eyelid, for the first time during several months, was moveable. The day after, the tumour over the inner part of the eyebrow was entirely gone; the swelling of the upper eyelid was much smaller, its texture much softer, and it was less painful when compressed; the globe of the eye also had considerably retired within its orbit. By the 15th of April, great changes had taken place in the tumours; the globe of the eye had completely retired within its orbit, the general prominence of the upper eyelid had sunk proportionably, and not the slightest pulsatory or thrilling motion was perceptible in any of the diseased parts. By the 17th of May, the tumours had all disappeared, and the patient's general health seemed re-established; yet the wound was not entirely closed, although the ligatures had come away, the upper on the 18th of April, and the lower on the 4th of May.

On the evening of the 3d of July, Mr D. was called in great haste, in consequence of a bleeding which had taken place at the lower part of the wound. The hæmorrhage had ceased before he could reach the house. The colour of the blood was florid, and the quantity lost, 10 or 12 ounces. A similar discharge took place on the evening of the 9th of July, but, like the former, ceased spontaneously, and happily proved the last of a series of incidents, not unlikely to disappoint the hopes which the earlier circumstances of the case had inspired. From this period the course of events was prosperous; and on the 19th of July, which, reckoning from the morning of the operation, comprises a period of 103 days, the wound was firmly healed, and the patient's recovery secured. After a lapse of nearly two years, her cure appeared complete, with the exception of her sight, which seemed irrecoverably lost. With respect to the state of the local circulation, there was no pulsation to be felt in any of the branches of the left temporal and facial arteries; but, as in the case treated by Mr Travers, the carotid might be distinguished beating very feebly below the angle of the jaw, while a very brisk action of the collateral branches lying near the surface, was visible in the vicinity and along the course of the cicatrice.[8]

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[1] See case by Schmidt, in Ammon's Zeitschrift für die Ophthalmologie; Vol. p. 263; Dresden, 1831.

[2] Revue Médicale ; Tome iv. p. 400 ; Paris, 1832.
[3] Treatise on the Diseases of Arteries and Veins, p. 446 ; London, 1815.
[4] Mémoires de l'Académie Royale des Sciences, pour 1765 ; Tome xxxvii. p. 758 ; Amsterdam, 1771.
[5] Bell's Principles of Surgery ; Vol. iv. p. 262 ; Edinburgh, 1808.
[6] Medico-Chirurgical Transactions ; Vol. ii. p. 1 ; London, 1813.
[7] Op. Cit. p. 446.
[8] Medico-Chirurgical Transactions ; Vol. vi. p. 111 ; London, 1815. The reader will find a case of aneurismal tumour in the orbit, after concussion of the brain, related in the London Medical Gazette, (Vol. xvii. p. 851,) by Mr George Busk. A cure was effected by tying the common carotid, but it does not appear whether the aneurism was common, or anastomotic.

SECTION II.—ANEURISM OF THE OPHTHALMIC ARTERY.

Like the internal carotid by the side of the sella Turcica, the anterior cerebral, and other arteries within the cranium, the ophthalmic artery within the orbit is subject to true aneurism.

Case 190.—Mr Guthrie[1] saw a case of this kind, in which both ophthalmic arteries were dilated, and which terminated fatally. The symptoms were similar to those of aneurism by anastomosis, but no tumour could be perceived. The eye was gradually protruded until it seemed to be exterior to the orbit, but vision was scarcely affected. The hissing noise in the head could be distinctly heard, and was attributed to aneurism. On the death of the patient, an aneurism of the ophthalmic artery was discovered on each side, of about the size of a large nut. The ophthalmic vein was greatly enlarged, and obstructed near where it passes through the sphenoid fissure, in consequence of a great increase of size which the four recti muscles had attained, accompanied by an almost cartilaginous hardness, which had been as much concerned in the protrusion of the eye as was the enlargement of the vessels. The disease existing on both sides prevented Mr Guthrie from proposing any operation on the carotid, to which indeed, he thinks, the patient would not have submitted.

[1] Lectures on the Operative Surgery of the Eye, p. 158 ; London, 1823.

CHAPTER XI.

INJURIES OF THE EYEBALL.

In the first and second sections of Chapter IV. we have considered the injuries of the muco-cutaneous membrane, which covers the anterior surface of the eyeball. We have now to turn our attention to the injuries which affect the proper textures of this organ ; and here I shall take the opportunity, before entering on the enumera-

tion of the particular injuries which we are so frequently called on to treat, to warn practitioners against the neglect of depletion, and especially the neglect of general blood-letting, in cases of injury of the eye. The smallness and apparent slightness of such injuries are apt to lead to inattention, of which total loss of sight may be the result. Other remedies are no doubt necessary, both local and general, such as mercury where internal inflammation threatens, but this, as well as local means, is not so apt to be overlooked as the taking away of blood from the system. Many cases have occurred in my practice, in which vision, lost for weeks, has been speedily regained by venesection.

SECTION I.—INJURIES OF THE CORNEA.

§ 1. *Contusion of the Cornea.*

Foreign bodies, of small bulk, impinging with violence against the cornea, and immediately flying off, sometimes produce very severe inflammation, ending in ulceration of the part struck, infiltration of matter between the lamellæ of the cornea, and other dangerous effects. The cornea is sometimes permanently misshapen after a blow. I have never seen this, however, except in cases where at the same time the lens was dislocated.

§ 2. *Foreign Substances imbedded in the Cornea.*

It is a common occurrence for minute, hard, angular, and sometimes ignited particles to be projected with such force, as to penetrate through the conjunctival covering of the cornea, and into its proper substance; for instance, a chip of steel, a spark from the anvil, a minute fragment of stone, a splinter of wood, or a particle of glass. The presence of even a very small body of this description, so small, indeed, that it is with difficulty that we are able to detect it, produces a constant flow of tears, spasm of the orbicularis palpebrarum, and speedy inflammation of the external tunics of the eye. These symptoms do not, in general, subside, until the foreign substance is either removed by art, or comes away by a tedious and painful process of suppuration.

In a few hours after the extraneous substance is imbedded in the cornea, the adjacent portion becomes opaque, the opacity extending according to the violence of the inflammatory symptoms which succeed. The conjunctiva and sclerotica around the cornea redden, and the pain is varied in kind, and more or less severe, according as the one or the other of these tunics is chiefly affected with inflammation. If the conjunctiva is the chief seat of the increased vascularity, the patient feels as if the eye were filled with sand; if there is considerable sclerotitis, pulsatory circumorbital pain is ex-

cited. Inflammation of the iris may even be brought on, ending in effusion into the pupil, especially if there already exist a predisposition to iritis, or an inflammatory tendency be present in the constitution. In the meantime, the part in contact with the foreign body, killed perhaps by the impetus with which it was struck, or scarred by the ignited state of the particle, is gradually reduced to the state of a slough, which being loosened by the processes of ulceration and suppuration, at length drops out along with the foreign substance. An ulcer of the cornea is thus left, more or less deep, which in general heals up readily, leaving a leucoma or opaque cicatrice. If the foreign body be an unignited particle of iron, and be allowed to remain till it becomes oxidated, a brown speck is produced by the detention of the oxide in the substance of the cornea. (See page 218.)

Occasionally it happens that the inflammation of the cornea is very severe, and gives rise to infiltration of matter between its lamellæ. The foreign body being removed, and the inflammation abated by antiphlogistic means, the matter is generally absorbed; but if the case is still neglected, the purulent effusion may increase, hypopium may be added to the onyx which already exists, and the eye will, in all probability, be entirely destroyed. This result is particularly apt to follow, when rude attempts are made by common work-people, to remove particles of whinstone and iron which have become fixed in the cornea. From the journals of the Glasgow Eye Infirmary, I could quote several lamentable cases of this sort, in which a conceited mechanic, having attempted, with a common penknife, the removal of foreign substances, fixed in the cornea, violent inflammation followed, ending in extensive ulceration, onyx, hypopium, staphyloma, and of course entire loss of vision.

It is sometimes the case, after a foreign body has lain imbedded for a time in the cornea, that a layer of new substance is formed over it, so that the inflammation at first excited by its presence ceases, and it remains through life without giving rise to any farther irritation. I have frequently seen this happen to grains of gunpowder and sometimes to particles of coal driven into the cornea by explosions in the fire.

In other cases, the shape of the foreign substance, or the manner in which it is fixed in the cornea, may prevent it from either dropping out, or becoming invested in the manner now mentioned; it will continue, therefore, to produce irritation and inflammation, which may prove destructive to vision. I shall have occasion, under the head of *Penetrating Wounds of the Cornea*, to quote a case which occurred in Mr Wardrop's practice, which will illustrate this point.

When we proceed to remove a foreign particle imbedded in the cornea, we place the patient in a good light, and bandage up the sound eye, or close it with the fingers. The assistant, standing behind the patient, supports the head, raises the upper eyelid, and prevents the eyeball from rolling upwards. If no assistant be at hand, we may fix the head of the patient against the wall, or lay

him on a table and separate the lids with the fingers of the hand which does not hold the instrument with which the foreign particle is to be removed. Adams' speculum may be used with advantage, for elevating the upper lid, and fixing the eyeball. The patient should be directed to turn his eyes to some object placed before him.

If a particle of iron be fixed in the cornea, it is recommended to extract it by a magnet. This will rarely succeed, but may be tried.

When not deeply imbedded, foreign particles may be removed from the cornea with the edge of the small silver spatula. (See *Fig.* 30, page 218.) If more deeply imbedded, the point of a cataract needle may be used for dislodging the offending body. This, however, is not accomplished, in many cases, without fairly passing the point of the instrument under the particle of iron or stone, so as to lift it out of the cornea; and so firmly is the foreign body grasped in many cases by the spongy substance of the cornea, that even this plan will not succeed, unless the portion of the cornea external to the foreign particle is first fairly divided, and then pressure applied in the way described.

Dr Jacob tells us, that whenever he meets with a case in which a particle of iron has been allowed to remain until it has produced a stained ulcer, he scrapes the surface with the point of the needle, after removing the foreign body, in order to prevent any permanent stain.[1] Autenrieth, after the foreign body is removed, proposes to dissolve the remaining rust with diluted muriatic acid. Ammon in such cases removes both the foreign body, and a minute portion of the external lamellæ of the cornea with the extraction knife.[2] All these modes of practice appear highly objectionable. When the patient does not present himself till some days after the accident, the surgeon must examine the part carefully to ascertain whether the foreign body be still present, as he may otherwise be deceived by the brown oxide adhering to the spot.

When the extraneous body is removed by art, it leaves a depression in the cornea, which in general is soon filled up; and the surrounding opacity is gradually removed. It is often the case that in removing foreign particles fixed in the cornea, a considerable portion of its conjunctival covering is abraded, but this is reproduced perfectly transparent, unless acetate of lead is afterwards used in solution, as it too often is, for bathing the eye. This application renders the cicatrice opaque. In general, a little warm milk and water will serve as a sufficient collyrium, employed three or four times a-day. If the spasm of the orbicularis palpebrarum does not speedily subside after the removal of the foreign substance, the practice recommended at page 221, must be adopted. Bleeding with leeches, or from a vein of the arm, is highly beneficial, and must on no account be neglected when much irritation has been produced; the patient should be purged, and should remain at rest, without attempting to use the eyes, till all danger of inflammation is past. When a deep ulcer of the cornea has formed in consequence of such injuries as we

have now been considering, evacuation of the aqueous humour is one of the remedies which act most beneficially.

§ 3. *Punctured Wounds of the Cornea.*

Cases of punctured wounds of the cornea must be watched with great care, as the inflammation which follows is sometimes rapidly destructive. I have seen a prick with a needle produce, in the course of a few days, during which the case was neglected, such a degree of inflammation, as ended in a copious deposition of lymph and pus between the lamellæ of the cornea, and in the anterior chamber. Bleeding at the arm, the liberal application of leeches, purgatives, rest, and a strict antiphlogistic regimen, will be required. Against the inflammation of the iris, which is apt to arise, and end, if neglected, in closure of the pupil, calomel with opium internally, and belladonna externally, are to be employed.

§ 4. *Penetrating Wounds of the Cornea—Loss of the Aqueous Humour—Prolapsus of the Iris—Fistula of the Cornea.*

As the wounds which penetrate through the cornea into the anterior chamber vary much in their nature, being either clean-incised or lacerated; in their extent, from a mere puncture to the whole breadth of the cornea; and in their situation, being sometimes at the edge, and in other cases near the centre of the cornea; so their effects are very different in different instances. We meet with penetrating wounds of the cornea, so small and so oblique, that they give rise to no discharge of aqueous humour, and heal by the first intention, leaving scarcely any cicatrice; in other cases, the wound, for weeks, permits the aqueous humour to ooze through it, but at length unites, and perhaps leaves the eye without any serious permanent defect; while in a third set, the wound inflames, suppurates, and leaves an opaque cicatrice, which interferes more or less with vision, according to its situation and extent. We sometimes find that the irregularity of the cornea, at the wounded part, independently of opacity, gives rise to considerable obscurity of sight, and occasionally to double vision, when objects are regarded with the injured eye singly.

In nine cases out of ten, penetrating wounds of the cornea are followed by the instantaneous escape of a considerable portion of aqueous humour, and a protrusion of the iris. The latter consequence is much more apt to occur, if the opening in the cornea is situated near its edge. The prolapsus results partly from the iris losing the support of the aqueous humour which has been evacuated, partly from the push made by the rest of that fluid to escape also by the wound. The pupil is dragged towards the prolapsed portion of iris, and, as but too often the prolapsus remains unreduced, the iris unites to the lips of the wound, and the deformity is permanent. Such is often the result in cases where children wound their eyes with sharp bodies, as a penknife, fork, pair of scissors, bit of glass, and the like.

The loss of the aqueous humour, although regarded by the ancients as equivalent to the loss of vision, is speedily repaired by the re-secretion of that fluid. The replacement of the prolapsed iris is a matter of much greater difficulty. It is often impossible to effect this replacement. Mr Lawrence states he has never seen it accomplished.[3] We may, however, occasionally succeed, by the following means, if they be employed within an hour or two after the accident, and especially if it is the pupillary portion of the iris which is prolapsed.

We find the eye already inflamed, intolerant of light, and probably acutely painful. The cornea will, in general, be more or less flaccid, and, on attempting to fix the eye, there is apt to follow a farther discharge of aqueous humour. The first means to be had recourse to is friction of the eye through the upper eyelid, continued for some minutes, and then sudden exposure of the eye to a bright light. This is a means which must not be hastily abandoned, but tried repeatedly, patiently, and for several minutes at a time. The object is to press back the protruding iris through the wound of the cornea, by moving the eyelid circularly over the surface of the eyeball. If this does not succeed, we may endeavour, with a small blunt probe, to lift one edge of the wound, and push the iris into the anterior chamber; and then, whether we succeed or not with the probe, repeat the friction of the eye and the exposure to bright light. If the wound is so situated between the centre and the edge of the cornea, that it is the pupillary portion of the iris which is prolapsed, we ought to lose no time in smearing the extract of belladonna on the eyebrow and lids, and dropping a filtered solution of it upon the eyeball. In the course of from 15 to 30 minutes, the belladonna will have probably operated on the unprolapsed portion of the iris, so as to dilate the pupil, and perhaps to drag back into its natural place the prolapsed portion. But if the wound is close to the edge of the cornea, belladonna ought not to be employed, as it only tends in this case, to produce a greater degree of prolapsus. After the belladonna has been applied a sufficient length of time, our attempts by friction, and with the probe, are to be renewed. If we are successful, the wound ought to be touched with a sharp pencil of lunar caustic, which serves to prevent any farther discharge of the aqueous humour.[4]

If the prolapsus of the iris still continues unreduced, it ought to be punctured, or a snip made in it with the scissors. This allows the aqueous humour which lies behind the prolapsed portion to escape, and favours the return of the iris into its natural situation, which we must now endeavour to accomplish by the means already indicated.[5]

Should all our attempts to reduce the prolapsed portion of iris fail, we have still a choice left of snipping it off with scissors, or of leaving it slowly to contract, and disappear. The former is certainly the preferable practice; for if left to itself, it long proves the cause of irritation, increases for a time, instead of diminishing, and

thereby drags the pupil more to one side, and leaves a broader cicatrice than if it had been removed. If the patient refuses to permit this to be done, the prolapsed portion may be touched every second day with nitras argenti. Under this treatment, it adheres to the cornea, gradually shrinks, becomes covered with a lymphatic effusion, and at length disappears, the pupil being left permanently disfigured, and vision more or less abridged, according to the size and situation of the cicatrice.

Very extensive divisions of the cornea are less liable to be attended with prolapsus of the iris, than those which are more limited. Thus, the section of the cornea in extraction of the cataract is rarely followed by immediate prolapsus, while a quarter-section, such as is made in forming an artificial pupil by excision, generally produces a protrusion of the iris. The same holds with regard to accidental wounds. The cornea has been known to be divided completely across by a sharp instrument, without any prolapsus of the iris, and to be cured with only a slight linear cicatrice.[6] In cases, however, of complete diametral division of the cornea, with a penknife, piece of glass, &c. very frequently the iris, though it has not prolapsed, unites to the cornea, and the lens, having been touched, is rendered opaque.[7]

The penetrating wounds of the cornea, of which we have been speaking are those made by foreign substances which are immediately withdrawn, as the point of a penknife, fork, or pair of scissors, sharp pieces of wire or wood, splinters of metal or stone projected against the eye, and the like. It sometimes happens, however, that the body with which the injury is inflicted, is left sticking in the cornea.

Case 191.—Cloquet tells[8] us that a peasant, from the neighbourhood of Paris, came to consult him for a *speck*, which he said he had on his left eye, and for which he had been under treatment for two months. On examining the eye, he found an ulcer of the cornea, in the centre of which he discovered a considerable splinter of iron. The cornea had been penetrated by this body, which Cloquet extracted.

The following is an instance of the same sort, to which I have referred at page 330:—

Case 192.—A patient applied at Mr Wardrop's hospital, with considerable redness of the left eye, and great intolerance of light. On the temporal edge of the cornea, there was an opaque spot; to which the pupil, which was irregular, adhered. Fourteen weeks before, when twisting a piece of gold wire, a small portion of it broke off and struck the eye. Three days after the accident, intense inflammation came on, with severe pain, which continued for five weeks, and resisted active depletion. From this period, the pain became less acute. A few days after applying at the hospital, a portion of gold wire was observed projecting beyond the surface of the cornea, and a considerable portion seemed to be impacted in the opaque spot. It was easily extracted by means of a pair of forceps, and was followed by a discharge of the aqueous humour. The portion of wire was fully 3 lines in length, and one extremity had penetrated into the anterior chamber. The patient felt much relieved immediately after the extraction of the foreign substance, and the inflammation and opacity soon subsided.[9]

It sometimes happens that a perforating wound of the cornea, close to the edge of the sclerotica, and entering the anterior chamber, becomes closed by the conjunctiva healing over it, although the proper substance of the cornea does not heal, so that

the aqueous humour flows out through the opening in the cornea, and elevates the conjunctiva in the form of a vesicle. If this swelling be removed with the scissors, a large quantity of thin fluid escapes, and at the bottom of the cavity which has thus been laid open, an orifice will be detected, leading into the anterior chamber. If nothing farther is done, the conjunctiva heals, but the *fistula corneæ*, as it is termed, remains, and the vesicular swelling returns. To close the fistulous aperture, it is necessary, after snipping off the conjunctiva, to touch the orifice in the cornea freely with the lunar caustic pencil.[10]

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[1] Dublin Hospital Reports; Vol. v. p. 372; Dublin, 1830.
[2] Zeitschrift für die Ophthalmologie; Vol. ii. p. 331; Dresden, 1832.
[3] Lectures in the Lancet; Vol. x. p. 482; London, 1826.
[4] See a case of prolapsus iridis, successfully treated by Dr Macfarlane, in Glasgow Medical Journal; Vol. i. p. 104; Glasgow, 1828.
[5] Gibson's Practical Observations on the Formation of an Artificial Pupil, p. 42; London, 1811.
[6] Rognetta, Cours public d'Ophthalmologie, Lancette Française, 7 Janv. 1837.
[7] Demours, Traité des Maladies des Yeux, Pl. 53; Paris, 1818.
[8] Pathologie Chirurgicale, p. 44; Paris, 1831.
[9] Lancet; Vol. x. p. 475; London, 1826.
[10] London Medical Gazette; Vol. v. p. 224; London, 1829.

SECTION II.—FOREIGN BODIES IN THE AQUEOUS CHAMBERS.

In many instances of penetrating wound of the cornea, the foreign body enters completely into the anterior chamber, and there remains till we extract it. We sometimes find that it has fallen to the bottom of the anterior chamber, more frequently that it is fixed in the iris or in the capsule of the lens, rarely that it has passed behind the iris so as to lie in the posterior chamber. In all these cases we proceed immediately to its removal, unless it be of a very small size. A grain of gunpowder, for example, which, passing through the cornea, is fixed on the anterior surface of the iris, or perhaps even a particle of metal of the same size, we should allow to remain. It has repeatedly happened that the point of a cataract knife or needle, breaking off in the anterior chamber, has been left there, and has become oxidized and dissolved.[1] We cannot calculate on the removal of larger and rougher metallic fragments in this manner. If they are fixed in the iris, or if they are impacted between the cornea and the iris, although without any laceration of the latter, they will almost certainly bring on iritis; and even if merely in contact with the crystalline capsule, cataract is the invariable result. Remove a metallic fragment from these several situations, and iritis and cataract may be prevented. In doing this, however, there is a danger of wounding the iris, of opening the capsule, so as to admit the aqueous humour into contact with the

lens, which will cause cataract, and of the iris prolapsing after the foreign body is removed.

The extraction of a foreign body from the anterior chamber may sometimes be accomplished by means of a hook, or a small pair of forceps, (*Fig.* 26, page 208) introduced through the wound of the cornea already present; but in other cases, this cannot be done, and the cornea must be opened with the cataract knife, about the 10th of an inch from the edge of the sclerotica. If the incision be made closer to the sclerotica than this, protrusion of the iris is very likely to occur, and will in general be found irreducible. I have seen the application of belladonna, in a case in which an angular fragment of steel was impacted between the iris and the cornea, dilate the pupil and carry the foreign body along with the iris to the very edge of the cornea; but I do not consider this as a practice to be generally followed preparatory to extracting the foreign substance by an incision of the cornea, as, I think, it favours prolapsus of the iris. Not unfrequently it happens that as soon as the incision is made through the cornea, the foreign body is forced out along with the aqueous humour, so that we are saved from any trouble of extracting it with instruments.

Case 193.—While a workman was chipping brass, a sharp fragment of that substance, about one line and a half long, was projected into one of his eyes. Twelve days after the accident, he came to me, when I found the bit of brass adhering to the internal surface of the cornea. There was no visible wound or cicatrice, but a considerable degree of iritis was present. I bled him at the arm, put him on calomel and opium, and dilated the pupil with belladonna. By these means, the inflammation and pain of the eye were reduced, and I proceeded to extract the foreign body. At the distance of the 10th of an inch from the sclerotica, I opened the cornea to the extent of fully more than two lines, taking care to keep the knife in the wound till some of the aqueous humour had oozed out, thus preventing a prolapsus of the iris, which is very apt to follow the sudden discharge of that fluid. I next introduced a small hook, and drew the bit of brass along the surface of the cornea, till it reached the wound, through which it was readily extracted. In a few days the eye was perfectly well.

It is remarkable, how little irritation is sometimes produced, for a considerable length of time, by a foreign body in the anterior chamber. Dr Rognetta[2] saw a fragment of stoneware, of the size of a pea, remain eight days behind the cornea, without producing any severe effects. The external wound had cicatrized. Left beyond a certain time, such a substance would infallibly destroy the eye.

It is an interesting fact, of which Ammon,[3] Salomon,[4] and Grüllich[5] have recorded examples, and an instance of which I have myself seen, that a foreign body lying in the anterior chamber, is apt to excite an exudation of lymph from the parts with which it is in contact, that this exudation, becoming organized, forms a sort of capsule over or around the foreign particle, and that, in consequence of this taking place, the irritation caused by the presence of the foreign body sometimes ceases entirely. This is an event, however, which we must by no means regard as affording ground for delay in removing foreign bodies from the aqueous chambers.

[1] Lawrence's Lectures in the Lancet; Vol. ix. p. 531 ; London, 1826.
[2] Cours public d'Ophthalmologie, Lancette Française, 10 Janvier, 1837.
[3] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde ; Vol. xiii. p. 418 ; Berlin, 1829.
[4] Ibid. Vol. xiv. p. 457 ; Berlin, 1830.
[5] Ammon's Zeitschrift für die Ophthalmologie ; Vol. i. p. 336 ; Dresden, 1831.

SECTION III.—INJURIES OF THE IRIS.

The more common injuries of the iris are, in the first place, punctures and lacerations through the cornea; secondly, displacement; and thirdly, separation of the ciliary edge of the iris from the choroid.

I once saw the iris become of a green colour, from exposure of the eye to a blast of steam. Blows on the eyes also cause greenness of the iris, probably from blood being effused into its substance.

The iris is abundantly supplied with red blood. Hence it generally bleeds on being injured, and sometimes so profusely as to distend the aqueous chambers. It is also very liable to adhesive inflammation, effusing fibrine from its injured vessels, and thereby becoming morbidly connected to the neighbouring textures.

1. Punctures and lacerations of the iris are apt to be followed by dilatation of the aperture, so as to form a permanent false pupil. Inflammation is to be guarded against in such cases, and combated by the treatment for iritis; namely, bleeding, mercury, and belladonna.

Case 194.—A gentleman punctured his left cornea near its upper-outer edge with one of the points of a pair of compasses. There was a distinct wound of the iris stretching from its great circumference to within a little way of the edge of the pupil. The aqueous humour distilled through the wound of the cornea for 14 days. The iris approached gradually to the cornea, and after the wound in the latter was closed, the anterior chamber seemed almost obliterated by the closeness of the two to each other. The wound in the iris continued open, and in fact never healed, and the iris was evidently thinned around the wound. The pupil had scarcely any motion, and vision, probably from spherical aberration being imperfectly obviated, was obscure. By and by, the iris retreated to its natural place, no cataract ensued, and vision became perfect.

Foreign bodies, such as a minute piece of metal or stone, left in contact with the iris soon become incapsulated, as has already been explained.

In scrofulous children, punctured wounds of the cornea and iris often end in closure of the pupil and wasting of the eye. A red fungous growth sometimes takes place from an injured iris, protruding through the wound of the cornea. In cases of wounds of the cornea and iris, producing violent inflammation, a severe sympathetic ophthalmia is apt to arise in the opposite eye, ending in amaurosis and atrophy.

2. Blows on the eye, (for instance, with the fist,) are not unfrequently followed by displacement of a considerable portion of the iris. The pupil is greatly enlarged, and one-half perhaps of the iris is thrust out of sight, so that the pupil extends on one side to

the very edge of the cornea. This accident is generally attended by effusion of blood into the eye, and is followed by amaurosis.

3. The connexion between the iris and the choroid is much less firm in man than in quadrupeds, and the consequence is that smart blows on the human eye are apt to separate the one of these membranes from the other, so as to form a false pupil. (*Fig.* 40.) The stroke of a whip, horse's tail, or twig of a tree, is frequently the cause of this accident. We have no means, in such cases, of bringing back the iris to its former situation. Belladonna dilates the false pupil as well as the natural one, narrowing the portion of the iris between them. The vision of the eye is, in general, much debilitated after this sort of accident.

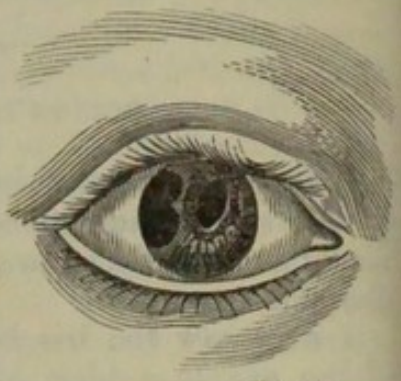

Fig. 40.

In a young gentleman, who came under my care, the iris was partially separated by a blow with a squib, the natural pupil was at the same time much dilated, and vision obscured. After venesection, and the use of calomel and opium, the false pupil began to diminish in size, and the natural pupil also contracted. Vision became almost perfect, but the false pupil did not close, nor have I ever seen the edge of the iris return in such cases to its natural place. When the iris is unhealthy in its structure, as it often is when we operate on it for the formation of an artificial pupil by separation, it is very apt to return towards the choroid; not so in such accidental separations as we are now considering, where the iris is perfectly healthy, and its fibres susceptible of their usual contraction.

Sometimes the greater part of the iris is detached, in which case it shrinks to a very narrow circle. (*Fig.* 41.) From the great size of the false pupil in such cases, the eye, though quite amaurotic, is highly intolerant of light, and must be covered with a shade.

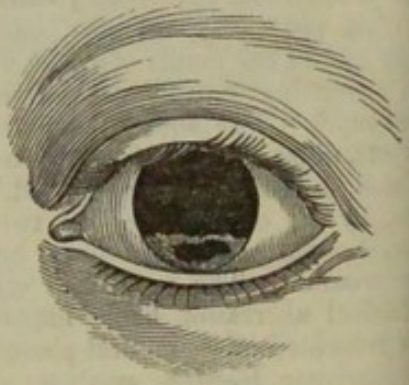

Fig. 41.

In other cases, a blow on the eye at once lacerates the iris across its whole breadth, and separates part of it from the choroid. *Figure* 42 shows this sort of injury in a patient of the Glasgow Eye Infirmary. Such cases are always attended with effusion of blood into the eye, so that, till this is absorbed, the state of the iris cannot be seen; afterwards we find the lens dislocated, the vitreous humour dissolved, the iris tremulous, and the retina insensible.

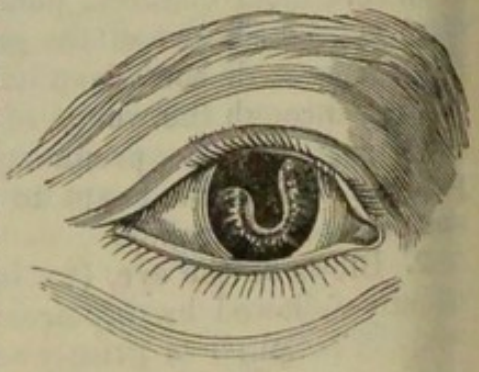

Fig. 42.

When with a penetrating wound of the cornea, there is combined a detachment of the iris, we often find that the lens and its capsule become opaque, the vitreous humour dissolves, and, as in the instance represented in *Fig.* 43, the eyeball enlarges, and the choroid shines through the attenuated sclerotica. The case here represented originated in a penetrating wound with a fork, and the choroid staphyloma was so large that after fruitlessly evacuating from time to time the dissolved vitreous humour, I was obliged to remove a portion of the sclerotica and choroid with the scissors, after which the eye shrunk to a size permitting it to be easily covered by the lids.

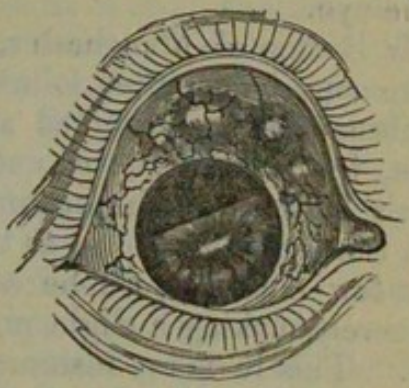

Fig. 43.

SECTION IV.—INJURIES OF THE CRYSTALLINE LENS AND CAPSULE.

§ 1. *Traumatic Cataract.*

Wounds of the crystalline capsule, by pointed or cutting instruments, pushed through the cornea or sclerotica, are speedily followed by opacity of the lens. This consequence, commonly attributed to the entrance of the aqueous humour, seems unavoidable, how small soever the puncture may be. A woman came under my care, to whom it had happened that as she was shaking a piece of cloth smartly, a pin was projected from the cloth into her right eye. It entered about the middle of the cornea, and punctured the capsule immediately behind the edge of the pupil. The result was complete lenticular cataract, and partial opacity of the capsule. If the wound is more considerable, we often see part of the lens exuding from the capsule, and presenting a bluish white appearance. The edges of the puncture or wound of the capsule are apt to inflame and become of a chalky white colour. If they unite, so that the aqueous humour is no longer admitted into contact with the lens, the progress of the cataract will be arrested. If the wound of the capsule is considerable and does not heal, the whole lens soon becomes coagulated and opaque, and in young or middle-aged persons is gradually dissolved, so that the pupil again becomes clear, and a certain degree of vision is recovered.

The injury which produces traumatic cataract is apt to be followed by iritis, and adhesions between the iris and the neighbouring parts. The pupil should therefore be as soon as possible brought under the influence of belladonna, and kept so till all danger of inflammation is past, or even till the lens has dissolved. Cold cloths should be applied constantly over the injured eye. The iritis is to

be combated by depletion and mercury. In scrofulous children, such an accident not unfrequently gives rise to amaurosis and atrophy of the eye.

Mr Barton of Manchester, from the fact that punctured wounds of the capsule are often followed by opacity and thickening of that membrane, with contracted adherent pupil, proposes to treat such cases, from the first, by extraction of the lens. He introduces Beer's knife through the cornea as far as the centre of the pupil, then raises the handle so as to depress the point, and keeps it there for a few moments, till he ascertains whether the lens will escape by merely making a slight pressure with the knife kept in this position. This in many instances takes place, but if he finds the lens too hard to pass in this way, he extends the incision, and finishes the operation with the scoop.[1]

Blows on the eye are often followed, months after the accident, by lenticular or capsulo-lenticular cataract. Such cases are not favourable for operation, as the retina is scarcely ever sound.

§ 2. *Dislocation of the Lens.*

We may distinguish the following varieties of this injury.

1. Days, weeks, or months after a slight blow, or mere tap on the eye, the transparent lens, reduced in size, drops through the pupil into the anterior chamber. Occasionally it happens that the patient cannot recall to his recollection the receiving of any blow on the eye, so that cases of this kind have sometimes been considered as spontaneous dislocations of the lens.[2] In general, no pain nor inflammation of the eye attends such cases, but the pupil is commonly dilated, and the retina not perfectly sensible.

2. From a penetrating wound or from a blow, the capsule bursts, and the lens comes into contact with the uvea. This dislocation is generally attended by considerable pain and inflammation, sometimes running on into suppuration within the eye, and often followed by amaurosis. If the lens is soft it may dissolve, and the pupil clear. If hard, it is merely somewhat reduced in size, and is apt to come forward from time to time into the anterior chamber, and again slip back through the pupil.

3. The capsule bursts from a blow, and the lens, having passed through the pupil, lies impacted between the iris and the cornea. The lens may continue transparent for many days after dislocation into the anterior chamber. If hard, it may remain for years in that situation. I have known the burst capsule accompany the lens into the anterior chamber, in which case they sometimes become the seat of calcareous deposition.

4. The capsule, enclosing the lens, separates completely from its natural connexions, the lens dissolves, the capsule becomes thickened and opaque, and this *cataracta cystica*, swims behind the pupil in a superabundant aqueous humour. In consequence of a blow on the right eye, a woman, who consulted me, saw dimly, and could

read a large type only when she held the book near the eye. The pupil was natural; the lens transparent, but tremulous.

5. The lens, forced out of the capsule, is seen floating, deep in the dissolved vitreous humour. This variety of dislocation of the lens generally arises from a blow on the eye, which fills the aqueous chambers with blood. The blood is slowly absorbed; and then the lens is seen deep behind the pupil. If we puncture the cornea, the aqueous humour escapes, and the lens floats forward to the iris or to the cornea.

6. The choroid, sclerotica, and capsule being rent by a blow, the lens escapes out of the eye, and lies under the conjunctiva.

The following cases will serve to illustrate the principal varieties of dislocation of the lens:—

Case 195.—Dr James Brown brought to me, for consultation, a lad of 17, a potter, under the following circumstances. His right eye had been destroyed in childhood. For a considerable time he had been troubled with *muscæ volitantes* before his left eye. On the 1st September 1831, he received a very slight blow on the eye, with a bit of potter's clay, thrown at him in sport by one of his fellow-workmen. On the morning of the 4th, he found, on rising out of bed, that he saw indistinctly, and went out to wash his eye at a well, supposing that the dimness of sight arose from matter adhering to the eyelids. This produced no difference in the sight; on which one of his neighbours looked at the eye, and told him that he saw something wagging in the inside of it. He immediately came to Dr Brown, who discovered the lens lying at the bottom of the anterior chamber. It seemed quite transparent even on the 5th when I saw him, and was so much reduced in size as to move freely about on every inclination of the head. Its lower edge, where it rested on the floor of the anterior chamber, was somewhat square, as if absorption had been going on more rapidly there than elsewhere. The upper edge of the pupil was not covered with the lens, so that he saw over it. Belladonna was applied on the afternoon of the 5th, the pupil dilated, and that evening the lens fell back through the pupil into the posterior chamber. Next day he had no pain, and saw well, but the iris was evidently tremulous.

I had no doubt that in this case the dislocated lens would entirely dissolve; but the rest of the eye, unfortunately, appeared not to be in a sound state, and the patient was likely to become amaurotic.

Case 196.—A stout country-man, whilst working in a quarry, received a blow with a piece of stone on his right eye, four weeks before I saw him. He put himself under the care of the ignorant pretender to whom I have referred at page 330, who allowed him to remain without any thing being done which could effectually relieve him of the incessant and excruciating pain which he suffered in the eye and head. The sclerotica was intensely inflamed, the cornea unnaturally prominent and somewhat hazy, the iris in contact with the cornea, and the lens, broken in pieces and apparently swoln, lay in contact with the iris and cornea. Immediately below the cornea, the sclerotica presented a concave depression, where it had been struck.

It was evident that the capsule had burst, and that the lens, being pressed forward, had obliterated the aqueous chambers; an accident always productive of severe pain. I immediately opened the cornea by a small section at its upper edge, and instantly the soft disorganized lens was evacuated. The patient had 4 grains of calomel and 2 of opium at bedtime. The pain entirely ceased in the course of the afternoon, and never returned. On the 7th day after the extraction, he left Glasgow, to return to the country. There was still considerable zonular redness; shreds of opaque capsule occupied the dilated pupil; the lower part of the sclerotica still presented a concavity, instead of its natural convexity; vision, which from the violence of the injury and long neglect of proper means of relief, there was reason to fear had been altogether lost, appeared in some slight

degree to be returning, the patient perceiving light and shadow when he looked to his right.

A remarkable circumstance in the case just now narrated, was the permanent flattening given to the sclerotica by the momentary pressure of the stroke. We are not surprised that the eye should be bent for a moment from its natural shape, but that this effect should continue, is a thing not easily explained. We, however, see it happen to the eye not unfrequently; and in the following case the cornea presented itself in this deformed state.

Case 197.—An angular fragment of iron, about half an inch long, chipped off by a chisel, penetrated the right cornea of Samuel Lamont, within a line of its upper margin. Though immediately removed, it produced cataract and dislocation of the lens, as in the last case, with very violent inflammation, which continued unabated for five weeks before the patient came to the Glasgow Eye Infirmary, notwithstanding blood-letting, leeching and blistering. The lens was extracted by Dr Rainy, with the same striking relief which extraction generally affords in such cases. The cornea, at his admission, was more convex in its horizontal than in its vertical section, as if it had been compressed laterally. This form, which it permanently retained, served materially to impair the patient's vision. The retina appeared to be sound, and he saw considerably more distinctly when he viewed objects through a four inch convex glass.

Case 198.—James Lang, aged 66, applied at the Glasgow Eye Infirmary, on the 22d August 1831. Nine weeks previously, he received a blow with a piece of wood, on the right eye. The blow had ruptured the capsule, and the lens was lying in front of the iris. The pupil was much dilated. He had been greatly distressed since the accident, with circumorbital pain during the night, so that he had had little or no sleep. There was not much redness of the eye. Pulse 84. The left eye was glaucomatous, and he thought the vision of this eye had failed since the accident which had happened to the right.

The upper half of the cornea being opened in the way usually practised for extraction, the lens immediately escaped, followed by some dissolved vitreous humour. The lids of both eyes were brought together by strips of court plaister, and he was desired to keep his eyes quiet, as if he were asleep.

Next morning, he told us he had slept more during the preceding night, than he had done during the whole nine weeks he had suffered from the accident. He now complained little or none of the pain. There had been considerable watery discharge from the eye. The pupil remained widely dilated. It was uncertain whether he discerned light with the eye.

On the 24th, the edges of the incision were accurately in apposition. The pupil was still dilated, and the retina apparently insensible to light.

On the 9th September, he was dismissed, the eye perfectly free from uneasiness, but without any return of vision.

This, then, was a case of rupture of the crystalline capsule from a blow on the eye, a large hard lens passing through the pupil, and lodging in contact with the cornea for nine weeks, without becoming cataractous, or undergoing any sensible diminution in size, but causing incessant uneasiness, and during the night severe circumorbital pain. The practice adopted was simply extraction of the lens, which, under such circumstances, must be regarded exactly as a foreign body. The patient did not require a single opiate, and had scarcely a twinge of pain after the lens was removed.

Case 199.—We have an illustration of another variety of dislocation of the lens, in the right eye of Mary Mains, aged 50, admitted at the Glasgow Eye Infirmary on the 7th September 1831.

A month before her admission, she received a blow with the fist on the right orbital region. The integuments had been divided above the eyebrow, but the wound, at her admission, had perfectly healed, although the cicatrice was still

tender to the touch. The right pupil was dilated, the iris tremulous, the humours glaucomatous, the sclerotica and conjunctiva slightly injected with blood, and she had violent hemicrania. She could, with the affected eye, still distinguish the fingers and other large objects. Pulse 78; much thirst; bowels bound.

On the admission, then, of the patient, there was no appearance of dislocation of the lens. There was amaurosis, and, from the tremulousness of the iris, there was strong reason to suspect a dissolved state of the vitreous humour. I took the opportunity to remark to the students, that this was one of those cases, which are apt to be mistaken for examples of sympathetic amaurosis, arising from an injury of some of the branches of the fifth pair. She had received a cut above the eyebrow, and, had she not been conscious that her eye was struck as well as her brow, we might have been led to suppose, perhaps, that the cut on the brow was the cause of the failure of sight.

This patient was bled at the arm to the extent of 25 ounces; had 6 grains of calomel and 2 of opium at bedtime; and, next morning, a dose of sulphate of magnesia. On the 9th, the hemicrania was much relieved. She was ordered a pill of 2 grains of calomel and 1 of opium every night. On the 10th, she told us that the pain had returned on the afternoon of the 9th, and that it still continued very severe. The conjunctiva and sclerotica were more inflamed. She was cupped on the right temple, and ordered to take two of the pills at bedtime. The pain was relieved by the cupping. On the 12th, the salts were repeated. On the 13th, the pain continued mitigated, and the redness was less. On the 14th, she told us that the pain had set in again in the afternoon of the 13th, and had continued severe until about eight in the evening, when it ceased, and that she found her vision had become much better than it was the day before. At the visit we found the eye free from pain, and she saw so much better, that she could distinguish one individual from another. The tremulousness of the iris was not so observable, but the pupil was more dilated. The lens had from the previous day, become moveable, and was seen, of a glaucomatous appearance, bobbing about, on every motion of the head, at a considerably greater distance than natural behind the pupil. The upper part of the dilated pupil was clearer than the rest, the lens being partially sunk.

Such dislocation of the lens as occurred in this case, we may call *secondary*. It did not result immediately from the injury, but from the vitreous humour undergoing a still farther degree of dissolution than it had suffered at the patient's admission, a month after the injury.

Case 200.—The annexed figure represents the effects of two different accidents, which, at the interval of some years, befell the right eye of an old man, the first patient in whom I happened to meet with a subconjunctival dislocation of the lens. On inquiring into the history of his case, he told me that the separation of the iris, represented in the figure, had been the result of the earlier accident, but that the tumour which I saw at the upper part of his eye was the consequence of a recent fall on the corner of a chair. The tumour had exactly the form of the lens, and the natural pupil was dragged towards it. On laying open the conjunctiva, the crystalline was easily withdrawn. The opening through the choroid and sclerotica, by which it had escaped, seemed already perfectly united. The retina was nowise impaired, notwithstanding the serious effects produced on the other textures of the eye, by the two accidents, and with a cataract-glass the patient could read an ordinary type.

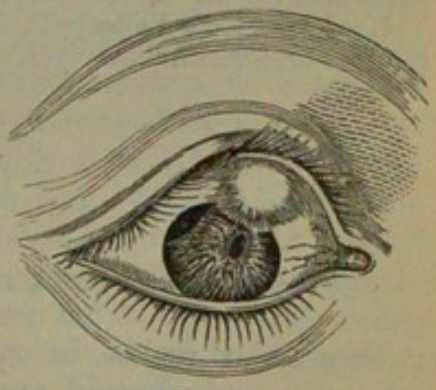

Fig. 44.

In such circumstances as were present in Case 195, of course no operation is necessary. We leave the lens to be dissolved.

In the 2d variety, where the dislocated lens presses against the

uvea, if the pain and inflammation are not immediately subdued by venesection, belladonna, and calomel with opium, extraction of the lens is the most effectual means both of relieving the patient, and of securing useful vision in the injured eye. If the lens is soft, a small section of the cornea will be sufficient.

In the 3d variety, where the lens lies in front of the iris, there is, in general, still less ground for hesitation as to the propriety of extraction. When a hard bulky lens lies in contact with the cornea, let the cornea be opened, as in common extraction of the cataract, care being taken, however, to pass the knife behind the dislocated lens, in order to prevent, if possible, the lens from slipping back through the pupil, and sinking into the vitreous humour, which, in cases of this sort, we generally find in a dissolved state.

In cases of the 4th and 5th varieties, the dislocated lens or the cataracta cystica is sometimes seen for years bobbing about in the posterior chamber, on every movement of the eye or head, occasionally passing through the pupil, and returning again into the posterior chamber, till, on some particular occasion, more irritation being excited by its presence in the anterior chamber than usual, iritis comes on with great pain in the eye and head, contraction of the pupil, and an impossibility of getting the dislocated body to retire, as it had been wont to do, into the posterior chamber. Under these circumstances, although unfavourable for an operation, extraction ought to be performed, to free the patient from the severe pain attending the iritis, and to save the sound eye from the danger of sympathetic inflammation.

I have seen two other cases of dislocation of the lens under the conjunctiva, besides the one above related. In one of them, the injury was the consequence of the patient being gored by a cow. In this case, the eye was partially, in the other, totally amaurotic.

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[1] London Medical Gazette; Vol. v. p. 784; London, 1830.

[2] Lusardi sur la Cataracte Congéniale, p. 29; Paris, 1827. Ammon's Zeitschrift für die Ophthalmologie; Vol. i. p. 260; Dresden, 1831. In the 5th Vol. of Ammon's Zeitschrift, Dr Lorch relates a case, in which dislocation of the lens occurred in both eyes, after a fall on the back of the head.

SECTION V.—WOUNDS OF THE SCLEROTICA AND CHOROIDEA.

From the retina being generally implicated, wounds of the sclerotica and choroid are more dangerous to vision than wounds of the cornea. Indeed, rupture or laceration of the sclerotica scarcely ever happens, without loss of vision.

Incised wounds of the conjunctiva and sclerotica, are instantly followed by a protrusion of the choroid, which we have no other means of repressing, than by directing the patient to keep the eye-

lids shut as much as possible, so as to give a degree of support to the eyeball. The protruding choroid will gradually shrink, and we need neither puncture it, nor snip it away. The wound never heals, without leaving a considerable cicatrice, the space between the edges of the divided sclerotica being filled up by an effusion of lymph, which gradually assumes the appearance and texture of a membrane. The conjunctiva sometimes heals in cases of this kind, while the sclerotica continues open, with the choroid projecting through it.

I have seen a small puncture of the sclerotic and choroid, near the edge of the cornea, give rise to tremulousness of the iris and incomplete amaurosis. In other cases, I have met with prolapsus of the iris through a punctured wound in the same situation.

When both sclerotic and choroid are divided in a considerable extent, the vitreous humour immediately issues from the wound, which also bleeds profusely. The vitreous cells become injected with blood, and form a fungus-like protrusion from the wound, which it is proper to snip off with the scissors. In other respects, this case is to be treated like the former. Besides the use of antiphlogistic means, the eyelids must be kept shut. Most frequently vision is entirely destroyed by the loss of vitreous humour, the injury done to the retina, and the violent inflammation of the eye which follows the accident. The inflammation, however, is not so violent where much of the vitreous humour is lost, as where only a small quantity escapes, nor is the form of the eye necessarily lost; although it has been emptied of a great part of its contents. An aqueous fluid fills the cavity of the eye. If almost all the vitreous humour has been evacuated, the membranes shrink, and the eye remains in a dwarfish state; it is moveable, and can be covered by a glass eye.

If the lens has been left in the eye, it becomes opaque; but frequently the lens escapes through the wound along with the vitreous humour. An opaque deposition at the bottom of the eye is not an unfrequent result of penetrating wounds of the sclerotica and choroid, as I shall have occasion to state more fully under the head of *Non-malignant Tumours of the Eyeball* in a subsequent chapter.

If the sclerotica and choroid have been opened by a splinter of iron or stone, projected against the eye, it should be ascertained whether the splinter is not lodged in the eye. If it has sunk into the vitreous humour, it should be extracted. I have seen several cases, in which such foreign bodies have been left within the eye, the wounds cicatrizing, and remaining closed for months; after which they again opened, and the foreign bodies, coming into view, were extracted.

SECTION VI.—PRESSURE AND BLOWS ON THE EYE.

§ 1. *Amaurosis from Pressure.*

Beer relates the following instance of the bad effects of pressure exercised on the eyeball :—

Case 201.—A man, who had previously enjoyed excellent sight, happened to be in a company of friends, when suddenly a stranger stept behind him, and clapped his hands upon his eyes, desiring him to tell who stood behind him. Unable or unwilling to answer this question, he endeavoured to remove the hands of the other person, who only pressed them the firmer on the eyes, till at length withdrawing them so as to allow the eyes to be opened, the man found that he saw nothing, and continued ever afterwards blind, without any apparent lesion of the eyes.[1]

§ 2. *Amaurosis from Blows.*

Blows on the eye are often productive of temporary or permanent amaurosis, without any visible change being produced in the organ; whence we may conclude that the blow has affected the retina by concussion, congestion, extravasation, or laceration. It is unfortunate that cases of traumatic amaurosis are often neglected, till the blindness is completely confirmed; for much may be done for their relief if they be taken in proper time. The following cases illustrate the danger of neglect, and the good effects of appropriate treatment :—

Case 202.—Mr N. applied to me on the 18th of January 1829, on account of the effects of a blow which he had received, eight days before, with a pretty heavy piece of metal, on the temporal side of the left eye. He was a man of about 40 years of age, of sound constitution, and his eyes had been good till this accident. Any inflammation or irritation produced by the blow had already subsided, although almost nothing had been done in the way of treatment. The vision of the eye was lost, except when he turned it very much to the left, so much indeed, as to look almost behind him. When he did so, he saw indistinctly any object situated to his left. Forwards or to the right he saw nothing, every thing being darkened by the appearance of a thick gauze or mist. A bright light, as a gas flame, was the only object capable of producing a sensation, when the eye was directed forwards. The amaurosis was so considerable, and had been neglected for so many days, that I pronounced a very doubtful prognosis, but urged the adoption of active measures.

Thirty ounces of blood were taken from the arm on the evening of the 18th. He took two pills, each containing three grains of blue pill mass and two grains of aloes, and was ordered two thrice a-day. On the 19th, he thought he saw objects somewhat less indistinctly, but still only when he looked much to the left hand. When he looked forwards, he saw as if gauze threads were moving before him, and the lamp appeared of various colours. Twenty-four leeches were applied round the eye. On the 20th, his vision was so far improved, that he could make out the large characters on the back of a quarto book, when he looked at it sideways. He could recognise any ordinary object, as a tea-cup, held towards his left side, but lost sight of it entirely as it was moved in front of him. A blister was applied to the left temple and behind the left ear. On the 22d, there was a great improvement in vision. He could now tell the hour on a watch, even when he looked straight forwards, and compared the apparent impediment of vision to branches of trees, whereas it formerly had the appearance of a uniform cloud. The mouth being considerably affected by the pills, they were omitted. The blister was re-applied. On the 24th, the blister was discharging well, the mouth was very sore, and the vision much improved. He could read a newspaper with the left eye, and said that the branches of trees which appeared before him were

now broken, and looked like grains of sand separated one from another. On the 26th, he stated that he knew an increase of vision daily. The mouth was still very sore. The blister was repeated. After this, the vision continued progressively to improve, and by the middle of February was all but perfect.

Case 203.—John Robertson, aged 17, was admitted at the Glasgow Eye Infirmary, on the 13th June 1831, six weeks after receiving a blow with a stick on the left eye. The lids swelled very much at the time, so that he could not open the eye for some days. When able to open it, he found the vision almost entirely lost, all that he retained of it being a mere perception of light and shadow. We observed that the pupil moved sympathetically with the other, but upon being exposed by itself, it contracted very feebly, on exposure even to bright light. Pulse 78; tongue foul.

He was bled at the arm, and ordered two mercury and aloes pills thrice a-day. Next day, he could discern objects. The pills not having purged him, he was ordered a dose of calomel and jalap. In a few days, the eye was perfectly well.

If it were necessary, I could quote several similar cases, showing the good effects of depletion, counter-irritation, and mercurialization, in amaurosis consequent to those blows on the eye, which are probably productive of congestion of the choroid and retina, but unattended by any other considerable lesion of these important structures.

§ 3. *Effusion of Blood into the Eye from Blows.*

The internal textures of the eye frequently give way under a blow; the blood-vessels of the choroid or of the iris burst, and fill the aqueous chambers, and sometimes the cells of the vitreous humour, with blood. The cornea, in such cases, presents a deep uniform chocolate hue, through which neither pupil nor iris can be seen. The vitreous body is generally disorganized under such circumstances, and the retina rendered insensible; although it sometimes happens, that as the effused blood is absorbed, vision is restored.

If we puncture the cornea in cases of this kind, there is, in general, a profuse discharge of bloody watery fluid. If the puncture is small, it heals in 24 hours, and may be repeated from time to time, without any ill effects. The vitreous humour may also be evacuated through the sclerotica.

§ 4. *Bursting of the Eye from Blows.*

In consequence of blows on the eye, with the fist, sticks, stones, and various projectiles, and from falls on the eye, we frequently meet with laceration of the sclerotica, with or without rupture of the conjunctiva, and of the choroid. Sometimes, though not so frequently, we meet with laceration of the cornea, which is more resisting than the sclerotica. The place of the eyeball most apt to burst under a blow, is immediately anterior to the insertion of the recti. The conjunctiva, from its laxity, sometimes escapes, while the sclerotica, owing to the tension produced by its contents, is unable to withstand the effects of a blow, and consequently gives way. As I have already mentioned, I have repeatedly seen the sclerotic and choroid ruptured, with the lens propelled through the lacerated opening, so as to lie immediately under the conjunctiva, which remained entire.

In cases of bursting of the eye from a blow, whether the laceration is through the cornea or through the sclerotica, considerable hæmorrhagy takes place, especially when the choroid has also given way. The humours are also often partly, and sometimes almost wholly evacuated, so that a dwarfish deformed eyeball is left after the lacerated part heals up. If the lens, or shreds of the iris, project through the wound, they should be removed, as they will prevent the wound from healing.

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[1] Pflege gesunder und geschwächter Augen, p. 10; Frankfurt, 1802.

SECTION VII.—GUNSHOT WOUNDS OF THE EYE.

1. Under this head, I may notice some of the effects of gunpowder exploded into the eye. It is generally the lower portion of the cornea which suffers most from this accident, but in an instance which came under my observation, as the person was in the act of stooping to the ground when the powder exploded, only the upper half of each cornea received the injury, and was left opaque. I have repeatedly seen grains of powder propelled through the cornea into the lens, so as to cause cataract. In one case, a grain of powder, propelled through the cornea, traversed also the lower part of the iris, in which it left a considerable opening, and, striking the lens, produced cataract. Gradually the opaque substance cleared away behind the false pupil, and vision was restored. The natural pupil remained much longer cataractous, but at length it cleared also. The patient saw well with a cataract-glass.

2. Injuries of the eye from grains of small-shot are not unfrequent. Mr Lawrence mentions[1] that he once saw complete blindness caused by a single grain, which merely struck the sclerotica obliquely, and did not enter.

If the grain passes through the sclerotica, it is almost always fatal to vision; and the same result follows, if the grain perforates the cornea and passes deep into the eye. But if it lodges in the anterior chamber, the retina may retain its sensibility, the grain sinking in the aqueous humour. An incision is to be made, under such circumstances, with the extraction knife, and the grain removed. In one case which I saw, a grain passed through the sclerotica, close to the cornea. Vision was instantly extinguished. Severe inflammation followed; the iris became of a dark greenish hue; the pupil was deformed, the iris being broader towards the wound than in the rest of its extent; and the eye was boggy. Demours has represented a case in which a grain of small-shot passed through the cornea, detached the iris from the choroid, and produced opacity of the lens.[2] He relates another case, in which a double grain passed into the sclerotica, near the edge of the cor-

nea, and remained fixed, the one grain being without and the other within, till he extracted them. The sight of the eye was saved.[3]

It not unfrequently happens that at the same time that grains of small-shot penetrate the eyeball, they also lodge in the cellular membrane of the orbit. Symptoms of inflammation within the cranium are not uncommon after such injuries, and the patient is often affected with severe neuralgia.

Case 204.—A young man was looking up towards a tree, upon which was seated a woodcock, his master was about to fire at; upon the young man's giving the signal, the sportsman fired, and several grains of the small-shot, rebounding from the boughs, struck the lad, perforating the eyelids and skin of the forehead. One entered the left eyeball, immediately above the upper edge of the cornea. The surgeon tried to trace the grains of small-shot with the probe, into the cellular membrane of the orbit, but could not touch any of them. The lad was leeched and purged.

I saw him nine days after the accident, when the eye presented the appearance represented in the annexed figure. There was a red vesicle-like protrusion of the choroid at the place where the grain had entered the eye, and round this the sclerotica was considerably depressed. The iris was deficient at its upper part, where it had been torn through by the grain of shot. Behind the pupil there appeared a reddish white cloud, the remains of the blood effused into the vitreous humour. The patient retained a bare perception of light and shadow with this eye.

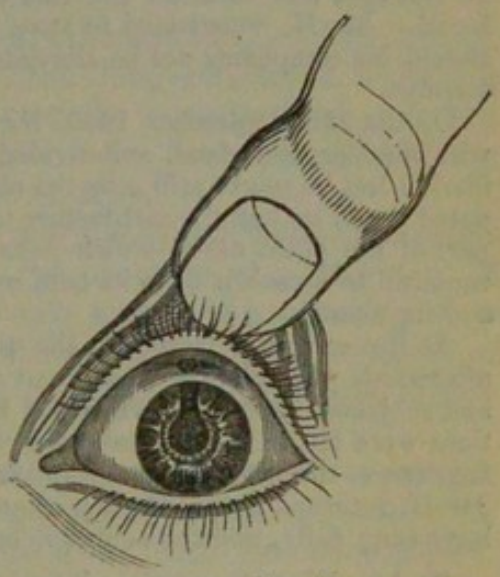

Fig. 45.

The right pupil was large and sluggish. With this eye the patient could read the large letters of a title-page. It appeared probable that some grains of small-shot were lodged in the cellular membrane of the right orbit.

In the course of some months the vision of the right eye improved, while the left eye became more and more atrophic, the lower part of the cornea sinking into a concave form, and the humours behind the pupil assuming a yellowish green colour.

Case 205.—Mr H. aged 50, came from Camborne in Cornwall, and first consulted Dr Butter at Plymouth, in September 1830, on account of total blindness in his left eye, accompanied occasionally with great pain. He had also some degree of amaurosis, with photopsia, of his right eye. The following was the history of his case.

On the 19th February 1827, whilst shooting, a gun was fired at a woodcock by another person, and a shot lodged in his left eyeball, producing instant blindness. For a fortnight afterwards, he did not suffer greatly; but during the four years and a half preceding his application to Dr Butter, the pain would at times flash so suddenly and intensely through his left eye and head, and so seriously disturb the visual functions of his sound or right eye, that, in whatever occupation he was engaged, his sufferings obliged him to desist for a time, and to apply leeches and other remedies. The fear of losing the sight of his sound eye from sympathy, added to the pain of his left, induced him to seek, and even to urge, the extraction, if possible, of the shot, which he knew, from his acute feelings, must be situated in some very sensitive part of his left eye.

The left eye was rather less in size than the right. It was entirely free from inflammation. On the nasal side of the eye, a fistulous opening was perceived a little behind the edge of the cornea. A fine gold probe could be passed through this opening, nearly into the posterior chamber. It was evidently the entrance

of the shot. The iris was not materially altered. Behind it a cataract was distinctly seen.

Dr Butter, in consultation with Mr Luscombe, agreed to dissuade Mr H. against an operation, or any attempt to search for a shot the position of which was extremely doubtful and uncertain; but it was the wish of the patient that some trial should be made.

On the 9th September 1831, Dr B. extracted the cataract, which consisted of calcareous matter and spiculæ of bone. He afterwards syringed out some gritty matter. It was hoped that the removal of this bony lens would be followed with corresponding relief, but in this hope the parties were disappointed.

On the 23d February 1833, Mr H. returned to Plymouth, and requested Dr B. to make a farther attempt for the removal of the shot, which his feelings denoted still to remain within his eye. He pointed to a bluish and prominent part of the eyeball under which he thought the shot was lodged. Dr B. hooked up the prominent portion of the sclerotica, cut it off with the scissors, and made an aperture sufficiently large to enable him to explore with the probe the cavity of the eye, and to allow the exit of the vitreous humour. Still no shot was found. Mr H. determined to have his whole eye extirpated at a future period, should his complaints not be alleviated by the suppuration following this second attempt.

On the 23d September 1833, Dr B. removed the whole of the left eyeball, with the lacrymal gland, and divided the optic nerve close to the foramen opticum, fearing lest he might still miss the object of pursuit. On dissection of the extirpated parts, he had the satisfaction to find a duck-shot impacted so firmly in that part of the optic nerve which joins the retina, that a considerable effort was required to detach it from its bed, in which it must have been fixed for six years and six months.

At the end of a fortnight, the patient was nearly well, but for three weeks afterwards was detained on account of adhesions which formed between the lids and subjacent parts, and which Dr B. repeatedly divided. Some morbid sensations were felt in the ophthalmic division of the fifth pair, and also in the ramifications of the superior maxillary, for which Dr B. prescribed carbonate of iron. Mr H. returned home, 47 days after the operation; the strength of his right eye increasing daily, and the neuralgic complaints becoming mitigated.[4]

3. Mr Watson notices[5] two cases in which small portions of exploded percussion caps having struck the eyeball, complete blindness was the immediate consequence, although the eye retained its natural appearance and no serious wound seemed to have been produced.

I have seen several instances of one of the fragments, into which a percussion cap breaks when it is exploded, entering the eye. This may happen either in shooting with percussion caps, or in discharging them with a hammer, as children sometimes do for amusement. In such cases the injured eye is exceedingly liable to be lost, while sympathetic inflammation may endanger even the other eye, especially if the foreign body is left unextracted.

Sometimes a fragment of an exploded cap fixes in the cornea, but is not seen, being immediately hid in the whitish scarred substance of the cornea. After some days, a blackish point is seen protruding from the slough. This is the bit of cap, which, being extracted, is found to be rough and angular.

The fragment, traversing the cornea, may lodge in the anterior chamber, or fix itself in the iris; but more frequently it passes into the posterior chamber. The wound made by the entrance of the fragment, generally heals without difficulty. Immediately after the

accident, the changes produced are so like those observed in penetrating wounds of the eye, when no foreign body remains in it, that it is impossible to ascertain, at first, whether the cap is in the eye or not. Vision is more or less affected immediately after the injury, according as the lens, retina, and other structures are implicated.

It not unfrequently happens that for a length of time, verging from a few days to a month after the accident, the eye appears to be recovering; but at the expiration of that time, it is suddenly seized with most acute pain, attended with chemosis, and sometimes with haziness of the cornea. Suppuration of any part of the eye rarely, if ever, occurs in such cases. In a day or two, the pain may become mitigated, or for a while it may entirely subside; but this cessation is only temporary. The pain recurs and subsides at uncertain periods, until the vision of the injured eye is entirely destroyed. The eyeball is left in a state of chronic inflammation, and the health of the patient is much affected by the long-continued irritation occasioned by the injury, and the anxiety he is under for his sight; for at this stage, the vision of the other eye becomes affected, by the inflammation extending to it by sympathy.

Mr Barton, of Manchester, thinks that the sympathetic inflammation, in those cases, is occasioned by the presence of a fragment of cap in the injured eye, and that the only means of preventing such inflammation, or of allaying it when it has arisen, is the removal of the fragment. He has treated many cases on this principle, which appears to be perfectly just.

The patient being placed in a convenient position, the operator forms, by means of Beer's knife, a large flap of the cornea, which he seizes with a pair of forceps, and cuts away with curved scissors. A dose of laudanum is then given, and a linseed-meal poultice applied over the eyelids. The operation always gives great pain, and should be performed as rapidly as possible. The eye is so exceedingly sensitive, that attempts to find the fragment of the cap cannot be endured. In all Mr Barton's cases, the cap was found in the poultice, or in the coagulum which closed the opening into the eye, one or more days after the operation.

The fragments of caps taken from the eye, after being within it for months, were only tarnished; they bore no appearance of undergoing changes similar to those which take place in pieces of steel during their exposure to the humours of the eye; they were always of considerable size, and their angles were sharp.[6]

The same practice may be extended, with good effects, to other cases of foreign substances lodged within the eye.

4. The eyeball most frequently bursts in cases where it is struck by musket-shot; but occasionally it escapes with apparently little injury, the ball penetrating between the eye and the orbit. Exophthalmia, or inflammatory disorganization of the eye, with protrusion, is very apt to follow in either of these cases. When this symptom does occur, either the humours should be evacuated by a free and deep incision, so as to allow the eyeball to shrink and

become quiet; or, if it has become solid from thickening of its coats, it ought to be extirpated. If such practice is not followed, the patient is generally doomed to suffer extreme pain for a length of time; and the enlarged eyeball is even apt, by pressure, to produce absorption of the roof of the orbit, and fatal inflammation of the dura mater and brain.

5. What is styled the wind of a ball has been known to produce amaurosis.

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[1] Lectures in the Lancet; Vol. ix. p. 531; London, 1826.
[2] Traité des Maladies des Yeux; Planche 52, Fig. 1; Paris, 1818.
[3] Ibid; Tome ii. p. 503.
[4] London Medical Gazette; Vol. xiii. p. 888; London, 1834.
[5] Edinburgh Medical and Surgical Journal; Vol. xliv. p. 106; Edinburgh, 1835.
[6] See Crompton on Injuries of the Eye by Percussion Caps, in London Medical Gazette; Vol. xxi. p. 175; London, 1837.

SECTION VIII.—DISLOCATION OF THE EYEBALL.

I have already had occasion (pages 14, 15) to quote two cases of dislocation of the eyeball, produced by foreign substances thrust between the eye and the orbit; and I have explained, that by being dislocated, is to be understood that the eyeball is extruded beyond the fibrous layer of the eyelids. The optic nerve, when the eye is in that state, is put on the stretch, the lids can no longer be brought together, and vision is in general lost till reduction is accomplished.

If the foreign body by which the dislocation has been produced be still in the orbit, it must, of course, be removed before reduction be attempted. After this is effected, the eye is to be pressed steadily back into its place. The pressure being continued for some time, the eyeball will generally be found to start suddenly back into the orbit, and vision to be immediately restored.

From the obliquity of the base of the orbit, it is evident that towards the temple the eyeball stands in a considerable degree exterior to that cavity; and hence it is that a severe blow on the eye, for instance, with a racket ball, is capable of producing dislocation. Covillard, in his *Observations Iatro-chirurgiques*, relates a case of this sort. He tell us that the dislocation was so complete, that when he arrived, immediately after the accident, he found one of the patient's friends with scissors in his hand, ready to cut the eye away. Covillard reduced it, and the patient's vision was preserved.[1]

Weld mentions,[2] that at Richmond in Virginia, it was nothing uncommon to meet with persons deprived of one or both eyes from the horrid practice of *gouging*, in which the combatant, having twisted his forefingers in the side-locks of his adversary's hair, applied his thumbs so as to force the eye out of the socket.

[1] Mémoires sur plusieures Maladies du Globe de l'Œil, par Louis; in the Mémoires de l'Académie Royale de Chirurgie; Tome xiii. p. 266; 12mo; Paris, 1774.

[2] Travels through the States of North America; by Isaac Weld, jun. Vol. i. p. 192; London, 1800.

SECTION IX.—EVULSION OF THE EYEBALL.

The eyeball is often blown out by musket-shot; but cases of its being torn out of the socket by other means are rare. A remarkable instance of this, however, is related in the first volume of Gräfe and Walther's Journal. A cart-wheel went over the side of the head, and tore out the eyeball, along with 7 lines' length of the optic nerve, the muscles of the eye being left behind, and the orbit uninjured. The patient, a man of 75 years of age, recovered without any bad symptom.

CHAPTER XII.

THE OPHTHALMIÆ, OR INFLAMMATORY DISEASES OF THE EYEBALL AND CONJUNCTIVA.

SECTION I.—THE OPHTHALMIÆ IN GENERAL.

Under the term *inflammation*, is included, first of all, that state of parts characterized by *increased redness*, *unnatural heat*, *swelling*, and *pain*. This, indeed, is strictly inflammation, denoted by its four primary phenomena. The morbid changes which I shall presently enumerate, may be regarded as so many secondary phenomena, apt to succeed, but which do not necessarily succeed to this, the first stage of every inflammatory disease. So long as the part affected exhibits nothing else than increased redness, unnatural heat, swelling, and pain, and so long as these continue to augment, the disease is merely developing itself. An inflammatory attack having perhaps reached the greatest degree of violence of which this first stage is susceptible, may, without any new local phenomena being manifested, gradually subside through the means employed for its cure, or by the natural resolution of the disease.

On the other hand, the disease may go on, and manifest with greater or less rapidity, one or more of the following seven second-

ary phenomena of inflammation; namely, *effusion*, of red blood, of colourless blood, or of fibrine; *adhesion; suppuration*, from a secreting surface, or in the form of abscess; *ulceration; mortification; granulation;* and *cicatrization*. The part inflamed may pass through several of these states in succession, or several of them may exist together at the same time.

There is also a tertiary set of inflammatory phenomena, depending on the secondary; such as, *opacity, insensibility, change of form, hypertrophy, atrophy, induration, softening*, &c.

Inflammation, in whatever part of the body, and consequently in whatever part of the eye it originates, may terminate in any of the processes now enumerated. It is also well known that the secondary and tertiary phenomena of inflammation are always modified by the structure of the part affected. Every different texture of the eye, possessing both physical and vital properties peculiar to itself, suffers differently from the several processes of inflammation. In general, the modifications of inflammation from differences of texture in the parts affected, are displayed with much distinctness in this organ; in some cases, these modifications can be judged of only from their consequences, and by minute observation of the derangement, which remains in the organization, or in the function, of the part, which had suffered; while in other cases, from the delicate texture of the part, or its hidden situation in the eye, the modifications in question may escape detection.

The conjunctiva, sclerotica, cornea, and iris present a series of the modifications of inflammation, to which I have just now referred, sufficiently distinct to convince the most sceptical of the truth of what I have been asserting, and sufficiently striking to rouse the most inattentive to research. The muco-cutaneous conjunctiva secreting a flood of purulent matter, as in the contagious ophthalmiæ—the fibrous sclerotica affected for months with rheumatic inflammation—the cornea losing entirely its transparency, becoming infiltrated with pus, or destroyed layer after layer by a penetrating ulcer—the iris pouring out coagulable lymph, and this lymph forming the medium of morbid adhesions, so that the pupil is deprived of its natural power of expanding and contracting—these are facts, in which are displayed some of the modifications of inflammatory action, more distinctly and strikingly than they are manifested in any other part of the body.

There are other circumstances besides differences of texture which modify the inflammatory affections of the eye, rendering also this subject very extensive in the discussion, and causing the diseases to be occasionally very perplexing in the treatment. They are under the influence of peculiarities of constitution, and of constitutional diseases, and are subject to innumerable variations from the influence of sympathies. Scrofula, syphilis, and gout are each of them capable either of exciting inflammation in different parts of the eye, or of communicating to an inflammation, excited by other causes, such differences in character, as often to render it difficult

to recognise a disease, with which we are well acquainted in its simple or idiopathic form.

By the influence of local sympathy, inflammation of one texture of the eye never takes place without extending in some degree to the textures with which the first affected is in contact; by the same influence, an inflammatory disease originating in one texture of the eye shall be communicated to several of the other textures, the inflammation of the superficial tunics being communicated to those more deeply seated, and conversely that of the internal parts spreading outwards; and, while each texture obeys its own laws of morbid action, the whole organ in this way may become involved by what had at first a very limited existence, and perhaps a very trivial aspect.

We speak of conjunctivitis, sclerotitis, corneitis, iritis, and the like; but it must be understood that the inflammation in none of those affections is confined to the particular texture indicated by the name. The disease merely commences and has its chief seat in the particular texture indicated; the neighbouring parts are always more or less involved. Thus, in iritis, the membrane of the aqueous humour, the crystalline capsule, the sclerotica, the conjunctiva, and not unfrequently the choroid and the retina, are affected; so that iritis is an abbreviated mode of expressing an inflammation which in general involves almost the whole textures of the eye. The iris, however, is the focus of the morbid actions; and the part, which from its situation, its functions, and the morbid changes which it undergoes, affords the chief indications of the disease, and shows the principal effects of the remedies employed for its cure.

We are not to suppose that even in those ophthalmiæ, the focus of which is one or other of the exterior textures of the eye, and which we designate therefore by such names as conjunctivitis, corneitis, or sclerotitis, that the internal textures do not suffer. Dr Rognetta relates[1] that an old man, who had some short time before been attacked with a slight unilateral conjunctivitis, accompanied by photophobia, having died, in one of the Parisian hospitals, of inflammation in the chest, he dissected the eye, and found, to his astonishment, all the internal tissues inflamed; even the hyaloid and the retina were red, a circumstance sufficiently explanatory of the photophobia.

When we reflect, then, on the innumerable combinations which may take place among the inflammatory diseases of the eye, and the many causes by which these diseases may be modified, we shall be convinced, I think, that of all the subjects requiring descriptions and explanations of morbid actions and changes, there can be few more difficult than those diseases which have been swept together with so indiscriminating a hand under the name of *ophthalmia*. To consider these actions and changes individually, and only in a single texture of the eye at once, may seem to lessen the difficulty; for instance, to consider inflammation of the cornea, and to exhibit to ourselves in order, effusion of serum, effusion of coagulable lymph,

secretion of pus, formation of abscess, ulceration, mortification, and cicatrization, according as each of these processes manifests itself in the cornea. But to do all this is to consider and to exhibit what never takes place separately in nature. Unless this be kept in mind by those who begin to study the inflammatory diseases of the eye, they will be not a little perplexed by the diversified complications of morbid phenomena, which they will meet at every step of their progress.

The knowledge of the inflammatory diseases of the eye has been greatly retarded by the practice of confounding them all under the name of ophthalmia, and thus overlooking both the seat of the disease, and the peculiar nature of the inflammation. The consequence of thus viewing all these diseases without discrimination, has been a method of treating them equally preposterous. In fact, in the practice of those who have had no opportunities of properly studying the diseases of the eye, one routine of remedies continues to be used in every case in which the eye appears inflamed, and it often happens, that it is not till this routine is exhausted, and the eye in some of its essential parts is becoming seriously disorganized, that a suspicion arises of there being something specific or peculiar in the case. Even from the slight view which we have already taken of this subject, it is evidently impossible that the inflammatory affections of parts so widely differing in structure and function as those combined in the eye, can be treated at once indiscriminately and successfully. We find, for example, that the remedies which in the course of a few days are sufficient completely to remove inflammation of the conjunctiva, only aggravate inflammation of the sclerotica or iris, while the plan of treatment which speedily cures sclerotitis or iritis, if trusted to in conjunctivitis, would expose the eye to almost certain destruction. Great advantages will accrue, then, from the adoption of an accurate classification of the ophthalmiæ. One advantage of no inconsiderable moment will be, that we shall conduct our examinations of the inflammatory diseases of the eye which may come under our care, with much more accuracy than we could possibly do, were we to employ the vague nomenclature commonly used upon this subject. Having noted exactly the disease which is before us, we shall be able both to ascertain to our own satisfaction, the effects of the remedies which we employ, and to communicate our experience to others, which, without a just classification and perspicuous nomenclature, it is utterly impossible to do.

I have admitted into the following table the name of no disease, the distinct and separate existence of which I have not either ascertained in the course of my own observations, or been convinced of upon good authority.

I. CONJUNCTIVITIS.

1. CONJUNCTIVITIS PURO-MUCOSA.

1. Catarrhal.
2. Contagious, or Egyptian.
3. Leucorrhœal, or Ophthalmia neonatorum.

4. Gonorrhœal.

II. CONJUNCTIVITIS SCROFULOSA.
1. Phlyctenular.
2. Pustular.

III. CONJUNCTIVITIS ERYSIPELATOSA.

IV. CONJUNCTIVITIS VARIOLOSA.

V. CONJUNCTIVITIS MORBILLOSA.

VI. CONJUNCTIVITIS SCARLATINOSA.

II. SCLEROTITIS.
1. Rheumatic.

III. CORNEITIS.
1. Scrofulous.

IV. IRITIS.
1. Rheumatic.
2. Syphilitic.
3. Gonorrhœal.
4. Scrofulous.
5. Arthritic.

V. SCLEROTICO-CHOROIDITIS.

VI. RETINITIS.

VII. AQUO-CAPSULITIS.

VIII. ANTERO-CRYSTALLINO-CAPSULITIS.

IX. VITREO-CAPSULITIS.

X. POSTERO-CRYSTALLINO-CAPSULITIS.

XI. CRYSTALLINITIS.

XII. OPHTHALMITIS.
1. Phlebitic, or Ophthalmia from absorption of pus.

APPENDIX.

1. Compound Ophthalmiæ, as the catarrho-rheumatic, pustulo-catarrhal, &c.
2. Traumatic Ophthalmiæ.
3. Artificial Ophthalmiæ.
4. Sympathetic Ophthalmiæ.
5. Intermittent Ophthalmiæ.

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[1] Cours public d'Ophthalmologie, Lancette Française, 9 Février 1837.

SECTION II.—REMEDIES FOR THE OPHTHALMIÆ.

Before proceeding to describe the different inflammations of the eye, and explain the treatment peculiarly required for each, it may not be improper to offer a few rules of universal application in the treatment of these diseases, and to make some general remarks on the classes of remedies employed for their cure.

General rules. 1. It is a general rule of great importance in the treatment of any ophthalmia, to discover the cause whence it has arisen, and, if possible, to remove that cause, if it is still in opera-

tion. The cause may be purely local, or it may be constitutional; but in any case, if it be allowed still to operate, it is evident that every thing in the way of remedy must prove comparatively or entirely ineffectual.

2. In treating the various forms, varieties, and degrees of the ophthalmiæ, it is an essential object to have a clear conception of the accompanying constitution; for without rectifying the state of the constitution, we shall often fail in curing the attending local complaint. The previous diseases, also, of the patient should be ascertained.

3. The eye, and the body at large, must be defended from new sources of irritation. The original cause may be removed, but the disease may still continue, being kept up by other causes, of a nature very different from the original one, but equally detrimental. The primary cause is often local, and the secondary causes constitutional. After the first is removed, the second are liable to be overlooked.

4. As the exercise of the function of the eye would be a source of considerable excitement to it when suffering under inflammation, rest of the organ ought generally to be enjoined. It is necessary even to exclude the light, in most instances, by the use of a shade over both eyes. But this is not proper in every case. On the contrary, we are obliged sometimes to encourage patients to look at the light, and even to use the eyes a little. Rest of the body is of great importance, especially in the internal ophthalmiæ.

5. It is of great moment to examine the diseased organ carefully, and thoroughly, from time to time; in some cases daily, or even oftener. Many children lose their sight in the puro-mucous ophthalmiæ, no examination of their eyes ever being made, till the corneæ are destroyed. The oculist never declines the examination of the eyes, from any real or fancied difficulty.

Remedies. The remedies which may occasionally be required for the cure of the ophthalmiæ are very numerous; those which are most frequently used, and in general with complete success, are few and simple. They are not all, however, of one kind, but of very different kinds. Nay, for the same species of ophthalmia, as will be seen by and by, remedies of diametrically opposite effects are found useful. Common sense will dictate that it is not meant to employ discordant remedies together, nor even perhaps one after the other in the exact order in which they are enumerated. The particular circumstances of the case must often determine the choice of the remedies.

1. *Blood-letting.* Opening a vein of the arm, applying leeches round the eye, and dividing the inflamed conjunctiva, are the three modes of taking away blood, commonly had recourse to in this class of diseases. Opening the temporal artery, the external jugular vein, or the nasal vein, or cupping the temples, is seldom necessary. The three modes of bleeding first enumerated cannot be substituted one for another, and we should often run a risk of losing the eye, were we to attempt to cure by local, what will readily yield to general

eding, or *vice versa*. For instance, bleeding at the arm, by de-ssing the general strength of the patient, rather aggravates in ıeral than alleviates the scrofulous ophthalmiæ, while bleeding h leeches, by removing local turgescence, greatly relieves them; heck is readily put to most of the internal ophthalmiæ by general od-letting, while local has comparatively but little effect; in onic puro-mucous conjunctivitis, much more good is done by rifying the inside of the eyelids, than could be accomplished by ching or phlebotomy. Neither is it unimportant in what order succession we employ these three modes of taking away blood. eching, for example, when considerable synocha is present, pro-es much more effect if preceded by general bleeding; and espe-lly if the leeches are applied within a few hours after the impetus he circulating system has by that means been moderated.

There is no inflammatory disease of the eye which is curable by eding alone. I regard as foolish, the attempts to cure the con-ious or Egyptian ophthalmia by taking away blood from an artery vein in very large quantities, or till the inflamed membrane grows e from depletion; first, because even were this paleness produced, would be no test of the disease being subdued; secondly, because egree of blood-letting sufficient to produce even an approach to h an effect, would leave the patient in a state of great and unne-sary debility; and thirdly, because the disease can be cured by ilder plan of treatment.[1] All the ophthalmiæ require other re-lies besides the taking away of blood; and, therefore, while we ıe this means of cure very highly, we must by no means trust to lone in any case.

n taking away blood from the arm in any inflammatory disease the eye, the opening should be made large, so as to ensure, if sible, a considerable effect on the impetus of the circulation. e quantity to be removed will vary from 10 to 30 or 40 ounces, ording to the constitution of the patient, and the circumstances he disease.

Leeches ought to be applied, in general, not on the loose substance the eyelids, but over the nasal vein, on the temple, or forehead, behind the ear. The number applied may vary from one to nty or more. Two or three over the nasal vein will do as much od as twice that number on the lids. In infants, we often find ch good effected, by one leech on the middle of the upper lid; and in some chronic cases of inflamed and thickened con-ctiva, one or two, fixed on the internal surface of the lids, will found useful. Leeches to the mucous membrane of the adjacent tril are found to unload the vessels of the eye, and especially of conjunctiva. It has been proposed in variolous ophthalmia, and ıe other cases, to continue for a number of hours in succession a charge of blood by leeches behind the ears, as soon as one set p off, supplying their place by others. This is termed by the nch applying leeches *en permanence*.

by no means deny the efficacy of opening the temporal artery,

or taking away blood by scarifying and cupping the temples; but these modes are more difficult of execution, and are attended with a greater degree of irritation and pain than simple venesection, and the application of leeches. They also preclude, in many instances, the use of other means which are likely to be useful; as, blisters to the temple and behind the ear. The tight bandage necessary after arteriotomy is also objectionable in cases of ophthalmia, the painful degree of pressure, and the development of heat, which it produces, being apt to increase the uneasiness of the eye and head. Where general blood-letting is necessary, as in iritis, cupping cannot be trusted. It does not produce the same effect on the momentum of the circulation as phlebotomy. I have seen several patients who owed the loss, or at least the irreparable abridgment, of their sight, to their having been merely cupped for iritis, when they should have been bled at the arm. Twelve or fifteen ounces of blood, taken by a pretty large opening from the bend of the arm, has much more effect in checking any of the internal ophthalmiæ, than twice that quantity taken by cupping. We always find the blood buffy in iritis, and especially so in syphilitic iritis.

Scarification of the conjunctiva of the eyelids, and sometimes of that covering the eyeball, is, in certain cases, a valuable means of cure, from which we are not to be deterred by the theoretical notion, that the infliction of mechanical injury on a part already actively inflamed cannot be advantageous. Ample experience convinces me that scarification is useful, not only when inflammation of the conjunctiva is on the wane, but often even in the acute stage, and especially when considerable chemosis is present. One or two deep incisions, with a lancet the point of which is rounded off, being made along the whole length of the inner surface of either eyelid, a very considerable discharge of blood will probably take place, and if the lids be properly managed, blood will continue to flow for a considerable time. For this purpose, the lid ought neither to be held constantly everted till the bleeding ceases, nor allowed to fall back into continued contact with the eyeball, in either of which ways little blood will be obtained; but the lid ought to be alternately everted and permitted to return to its natural position, by which means the divided vessels are refilled, and thus a continued flow of blood is ensured. A bit of sponge wrung out of hot water is to receive the blood, but not to touch the incision, unless when the blood seems to be about to cease flowing, when the wound may be wiped to make it bleed again.

Scarification of the conjunctiva covering the eyeball, has generally been performed by incisions concentric with the edge of the cornea; but Mr Tyrrell has suggested[2] that it is better to make the incisions in a radiated direction from the cornea, and corresponding to the intervals between the insertion of the recti muscles. He recommends this plan in acute purulent ophthalmia, a disease in which the conjunctiva is generally much swoln. He thinks that in the common method of scarifying the eyeball, the vessels passing to

the corneal portion of the conjunctiva must be in great part, if not entirely divided, and the tendency to destruction of the cornea thereby augmented; whereas in the method of scarifying which he suggests, the principal vessels of the conjunctiva bulbi should not be injured, and yet the loaded state of the membrane should be relieved.

Along with scarification, we may class the snipping across of individual enlarged vessels, running over the surface of the eyeball, which is often useful, but not unfrequently employed when quite unnecessary. The mode which I generally adopt, and which I find most efficacious, is to raise a small fold of the conjunctiva with the forceps, and snip it away with the scissors. This fold rarely contains the enlarged vessel which we wish to cut across, but it is now exposed; with a small hook it is easily raised from the surface of the sclerotica, and divided.

The practice of removing with the scissors a circular portion of the conjunctiva round the edge of the cornea, as was advised by Scarpa[3] in cases of nebula, appeared to be almost entirely laid aside; but has been revived by Professor Sanson, as one of the means of treating gonorrhœal ophthalmia. He excises, by means of forceps and scissors, the ocular conjunctiva, and immediately afterwards cauterizes the palpebral conjunctiva with the solid nitrate of silver.[4]

2. *Paracentesis corneæ*, or *evacuation of the aqueous humour*, has been highly recommended by Mr Wardrop,[5] as a mode of depletion in some kinds of ophthalmia. Although in certain cases an invaluable remedy, it is rather too nice an operation to have come into general use.

The opening through the cornea, by which the aqueous humour is to be discharged, may be made with any of the knives commonly used for extracting the cataract, or with a broad iris-knife. It is sufficient that the point of the instrument be introduced so that it makes a puncture into the anterior chamber; this should be done at the distance of $\frac{1}{10}$th of an inch from the sclerotica, at any part of the circumference of the cornea. When the knife has penetrated into the anterior chamber, it may be withdrawn a little, and the blade turned on its axis, when the aqueous humour will readily escape. It is better not to remove the instrument altogether, till the fluid is observed to be discharged; for if the incision be not sufficiently large, and the knife taken away before the aqueous humour flows out, the elasticity of the cornea closes the wound, and either hinders the evacuation from being so sudden, and consequently so efficacious, or the closure of the wound entirely prevents its escape. The operation, therefore, which is necessary to discharge the aqueous humour, is merely the first step of the section of the cornea, made in extracting the cataract, or what is called the *punctuation*.

The chief difficulty in performing the operation, arises from the pain occasioned by the necessary pressure on an inflamed eyeball, whilst keeping open the eyelids; but until a sufficient portion of the cornea is brought into view, and the eye completely under the

management of the operator, the introduction of the knife should not be attempted. The upper lid should be elevated by the fingers of the assistant, or by Adams' speculum; while the operator, with the fore and middle fingers of the hand which does not hold the knife, presses down the lower lid, applying their points over its edge, in such a manner that they touch the eyeball, and can be made to exercise any degree of pressure upon it which may be necessary. Before the assistant raises the upper lid, the patient should be directed to look downwards; and then the assistant employs a sufficient pressure, to keep the eye in that position.

As the patient is very apt to start when he first feels the instrument coming in contact with his eye, it is useful to touch the cornea repeatedly with the back of the knife till all risk of starting is over; and as soon as its extremity rests on the part where the puncture is to be made, the knife may readily be raised on its point, and carried into the anterior chamber.

3. *Purgatives* act in two ways in the cure of the inflammatory diseases of the eye; namely, as depletory, and as sympathetic means. They reduce the quantity of circulating fluid, as well as remove the contents of the bowels, and from the continuity of the investing membrane of the eye with the lining membrane of the digestive organs, they prove a very effectual remedy in almost all kinds of ophthalmia. An active purge of calomel and jalap is often sufficient of itself to check an attack, when employed early. In the course of diseases of this class, occasional laxatives are always necessary; while in many cases, especially in children, nothing but a continued use of purgatives will effect a cure.

4. *Emetics* are of essential service in the treatment of various inflammatory affections of the eye, not only when there is reason to suppose that an overloaded state of the digestive organs is concerned in keeping up irritation, but as a means of lowering the circulation, and relaxing the skin.[6] In chronic cases, the sorbefacient effects of this class of remedies are also highly useful, promoting the absorption of unhealthy depositions, and thus assisting in restoring the transparent front of the eye to its natural condition.

5. *Diaphoretics* are useful in lowering inflammatory action in the eye, especially when suppressed perspiration has been, as it often is, the exciting cause of an ophthalmia. The eye, being invested by a continuation of the integuments, partakes in the good effects of a renewed secretion from the skin. We seldom, indeed, think of treating any ophthalmia by diaphoretics alone; but, after depletion, we employ this class of remedies as valuable adjuvants in the cure.

6. *Mercury.* The efficacy of this medicine in inflammations of the eye has long been established.[7] Without the aid of mercury, we might regard the internal ophthalmiæ, and especially inflammation of the iris, as incurable. It is as a sorbefacient that mercury proves so useful in the internal ophthalmiæ, powerfully promoting the removal of effused coagulable lymph, by an increased action of the absorbents. Whether it accomplishes this directly, by actually

stimulating the absorbents, or merely favours their action, by abating in some unknown mode, the inflammation, in which the effusion originates, we are unable to say; but the sad result of the internal ophthalmiæ, when neglected, and the admirable effects of mercury, in preserving the open and transparent state of the pupil, in these diseases, are placed beyond all doubt.

In the diseases to which I have alluded, we employ mercury, so as to affect the constitution, and in this way to operate on the eye; but in other cases we use it in smaller doses, in the expectation of deriving benefit from its well known effects on the secretory organs concerned in digestion.

7. *Arsenic* proves useful in some chronic inflammations of the eye, attended by hemicrania, and I have found it particularly serviceable in choroiditis.[8]

8. *Tonics.* The scrofulous ophthalmiæ, and almost all others in the chronic stage, are benefited by this class of medicines, of which cinchona is by far the most powerful. The treatment of the scrofulous ophthalmiæ with sulphate of quina is an improvement in ophthalmic medicine, perhaps scarcely less important than the treatment of iritis with mercury. The former diseases are much more frequent in their occurrence than the latter, and scarcely less dangerous in their effects upon the transparent parts of the eye.[9]

The mineral acids, and the chalybeates, are also highly valuable tonic remedies for certain kinds and stages of the ophthalmiæ.

9. *Opium, &c.* We are naturally led to employ anodynes in the hope of assuaging the severe pain attending many of the ophthalmiæ; but this is perhaps not their most important effect. Two of the most painful ophthalmiæ are the rheumatic and catarrho-rheumatic. Laudanum, rubbed on the forehead and temples, does much to relieve the pain; or if opium be taken internally, considerable alleviation will be procured; but much more good will be effected if this medicine be administered internally, combined with calomel. Calomel with opium may be regarded as almost specific in the rheumatic and catarrho-rheumatic ophthalmiæ. Either remedy by itself is much less efficacious. The opium acts not merely as an anodyne, but as a dirigent.

Opium, in vapour, and in fomentation, is employed directly to the eye in certain states of inflammation.

Tincture of tobacco, rubbed round the orbit, proves advantageous in allaying the pain which attends some ophthalmiæ.[10]

10. *Belladonna, &c.* A very peculiar set of narcotics, of inestimable value in ophthalmic medicine, consists of belladonna, hyoscyamus, and stramonium, which have the power of dilating the pupil.[11] They are used in a variety of ways, but chiefly in moist extract smeared on the eyebrow and eyelids. As in all the internal ophthalmiæ there is a disposition to closure of the pupil, one of these narcotics is applied once or oftener in the 24 hours to oppose this tendency. If severe inflammation is already present in the iris, they have little effect; but if the attack is incipient, or if it be

already yielding to the influence of blood-letting and mercury, the pupil is speedily expanded.

Belladonna and hyoscyamus, employed in fomentation, vapour, or friction, or given internally, are found useful in relieving the intolerance of light attendant on scrofulous conjunctivitis and corneitis.[12]

11. *Refrigerants—Emollients.* From the feeling of unnatural heat which attends most of the ophthalmiæ, the application of cold water may be regarded as a remedy to which the patient is prompted by instinct. It undoubtedly relieves for a time, yet in the internal ophthalmiæ it is positively injurious, while in many, or even in most other cases, its use is followed by a degree of re-action which is detrimental. Incipient inflammation of the external covering of the eye may sometimes be checked by cold lotions; but even in these cases, the same good may generally be obtained from tepid applications, without the risk of any hurtful re-action; exactly as the skin in fever is cooled with less risk by the tepid, than by the cold affusion. A tepid lotion soothes and relaxes the inflamed membranes of the eye, and being evaporated at the expense of the superabundant heat of the parts, acts, in fact, as a refrigerant, as well as emollient. Poppy decoction answers very well for this purpose.

Cataplasms applied over the eyes, though not hurtful in themselves, often prove injurious by leading to the omission of proper remedies. Many an eye bursts under a poultice, especially in ophthalmia neonatorum, and scrofulous ophthalmia. If we order poultices, then, we must not neglect to examine, from day to day, the eye over which they are applied.

12. *Astringents—Stimulants—Escharotics.* Under this head we include the innumerable substances applied to the surface of the eye, for the purpose not merely of constringing the tissues with which they come in contact, but of influencing the vital powers of the parts. The same substance, in different degrees of concentration, may serve as an astringent, a stimulant, or an escharotic.

In the internal ophthalmiæ, and especially in the acute stage, the application of stimulants is useless or destructive, while in conjunctival inflammations, more is effected by their means than by almost any other kind of remedy. Such astringents as alum, muriate of ammonia, sulphate of zinc, and sulphate of copper, have been in a considerable degree superseded by nitrate of silver, and muriate of mercury. Acetate of lead, from the opaque and generally indelible depositions its solution leaves on any abraded or ulcerated spot of the conjunctiva or cornea, ought to be entirely dismissed from ophthalmic practice.

Muriate of mercury is scarcely employed except in solution, as an astringent collyrium. In this form it is often used.

Nitrate of silver is applied in solution, in salve, and in the solid form. The average strength of the solution is 4 grains to 1 ounce of distilled water, but in the treatment of the purulent ophthalmiæ, 10 grains or more may be proper. The mode of applying it is to pour about a dozen of drops into an empty wine glass, take them

up with a camel hair brush, and touch with this the inflamed conjunctiva. The solution is immediately decomposed by the muriate of soda present in the tears and conjunctival mucus, and flows out from between the lids of a milky appearance, from the precipitation which has taken place of horn silver. Long continued, this solution tinges the conjunctiva of an indelible olive hue, and sometimes blackens permanently the cicatrice which follows its application to an ulcer on the cornea.

A nitrate of silver salve seems to have been first proposed by Dr Ryan,[13] as a remedy for specks, and afterwards by Mr Cleoburey[14] for ulcers of the cornea. Dr Ryan used 1 drachm of nitrate of silver to the ounce of axunge; Mr Cleoburey only 5 grains. Mr Guthrie[15] has the merit of introducing into practice this sort of salve, of various degrees of strength, up to that of 80 grains to the ounce, not merely as a remedy for ulcers and specks, but for different ophthalmiæ, even in the acute stage. Of whatever strength it is to be, the opium which Mr Cleoburey puts into his salve, and the liquor subacetitis plumbi which Mr Guthrie adds to his, are to be omitted. The nitrate of silver ought to be carefully levigated in a mortar, and the fatty matter with which it is to be mixed washed with boiling distilled water, so that all foreign ingredients, and particularly common salt, may be excluded, and thus the decomposition of the nitrate in the ointment retarded as long as possible.[16]

This ointment, of the strength of 10 grains or upwards to the ounce, is applied to the conjunctiva, on the principle that no two diseases can exist together at one and the same time. The ointment, being a powerful stimulant, is supposed to excite a greater, a more healthy, and at the same time a more transitory degree of inflammation than that already existing. It is chiefly in the granular or sarcomatous stage of the puro-mucous ophthalmiæ that this salve is useful. In applying it, it ought not to be put in, in a lump, upon the inside of the lids, as in this way it is apt to affect only that part of the conjunctiva which it first touches, and may even produce sloughing of that part. It ought to be taken up on the point of a greasy camel-hair brush, the lids are to be everted and wiped dry, and the salve penciled on with the brush upon the palpebral conjunctiva. An immediate chemical effect is produced on the surface of the diseased membrane, the nitrate being partially decomposed by the mucus of the conjunctiva, and reduced to the state of a chloride. Some complain but little of its effects, and are able, in half an hour or less, to open the eyes, and walk out into the street. Others suffer severely from its effects for three or four hours.

Solid nitrate of silver is sometimes applied[17] to the conjunctiva in a state of inflammation, and is a more manageable remedy than the strong salve.

The red precipitate and the sub-nitrate of mercury are employed only in the form of salves, and these are made of various degrees of strength.

The vinous solution of opium is applied either pure or diluted,

and in most chronic inflammations of the eyes proves highly useful. It also serves as an excellent tonic to prevent relapses. Any attempt to employ it, or indeed any other single remedy, as a panacea in the ophthalmiæ, would manifest a total ignorance both of this class of diseases, and of the uses of remedial agents.

13. *Counter-irritants*, including rubefacient liniments, blisters, and issues, are of much service in the treatment of the ophthalmiæ, especially in the chronic stage. By their means the blood-vessels of a neighbouring part, for example of the neck, are excited, those of the eye are thereby relieved, and the absorbents are thus favoured in their action.

Having thus gone over the chief classes of remedies employed in the treatment of the ophthalmiæ, I may mention that much is to be effected also, in the cure of these diseases, by dietetical regulations, using *dietetical* in its original and extensive sense, and comprehending under it every particular in the *mode of life*. Thus, attention to cleanliness, by the removal of morbid discharges from the eyes, pure air, early going to rest, quiet sleep, repose of mind, regulated diet, and proper exercise; all these, and many similar observances, are in a high degree conducive to recovery, while a neglect of one or more of these rules is often the cause of prolonged and severe attacks of inflammation, in different textures of the eye.

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[1] 'I have seen cases of ophthalmia where 160 or 170 ounces were said to have 'been taken (unsuccessfully, however,) in the space of three days; and I have 'been told, by other practitioners, that they have been in the habit of drawing 70 'or 80 ounces at one bleeding.' Calvert's Reflections on Fever; p. 3; London, 1815.

[2] Medico-Chirurgical Transactions; Vol. xxi. p. 414; London, 1838. London Medical Gazette; Vol. xxiii. pp. 571, 702, 815.

[3] Trattato delle principali Malattie degli Occhi; Vol. i. p. 246; Pavia, 1816.

[4] Julliard, De l'Emploi de l'Excision et de la Cautérisation dans l'Ophthalmie Blennorrhagique; p. 73; Paris, 1835.

[5] Medico-Chirurgical Transactions; Vol. iv. p. 153; London, 1813.

[6] Dobson, in Medical and Philosophical Commentaries; Vol. iii. p. 411; Edinburgh, 1784.

[7] Riverius (Opera, p. 263; Francofurti, 1674,) quotes with approbation the practice of Zacutus Lusitanus, who cured an ophthalmia in seven days by mercurial inunction, after a year's trial had been made of other remedies without effect.

Warner (Description of the Human Eye, &c. p. 39; London, 1773,) recommends mercurials with opium, in inflammation of the conjunctiva.

Plenck (De Morbis Oculorum, p. 80; Vienna, 1777,) recommends the internal use of mercury in gonorrhœal and venereal ophthalmiæ.

Dr Robert Hamilton published in Duncan's Medical Commentaries, (Vol. ix. p. 191; London, 1785,) an account of the good effects of calomel and opium, in inflammatory diseases. He speaks of the efficacy of mercury in ophthalmia as a fact long established.

By turning to Beer's Bibliotheca Ophtalmica, (Vol. i. p. 55, and Vol. ii. p. 85; Vindobonæ, 1799,) the reader will find that he was well acquainted, at the time of that publication, both with the effects of iritis, and with the power of mercury in preventing effusion of lymph into the pupil. He says that, blood-letting being premised, there is no remedy so powerful in subduing violent ophthalmia, and in preventing suppuration and effusion of lymph, as mercury.

[8] London Medical Gazette; Vol. xii. p. 18; London, 1833.

[9] In the first volume of the Medical Observations and Inquiries, published in 1763, Dr Fothergill and Dr Fordyce recommended a decoction of powdered cinchona bark, as a remedy for scrofulous conjunctivitis. In decoction, and in other forms, there can be no doubt that benefit must have been derived from bark in the hands of succeeding practitioners. At the same time, some authors have spoken unfavourably of this remedy, in the very ophthalmia for which it was recommended by Fothergill and Fordyce. 'Bark and other tonics,' says Mr Lloyd in his Treatise on Scrophula, p. 314, 'have been especially recommended '' in this species of ophthalmy, but though I have witnessed their exhibition in '' numerous cases, I never observed that they exerted the least power over this '' particular disease.'

In the year 1828, a child was regularly brought to my house from a distance of seven miles, labouring under obstinate phlyctenular conjunctivitis, for which I tried many remedies without avail. One day, when the child was brought in, some sulphate of quina was lying on the table, and it struck me it was worthy of a trial in so obstinate a disease. It cured the child in a few days. Other cases of the same disease yielded in the same favourable manner. I introduced the remedy at the Glasgow Eye Infirmary, extending its use to scrofulous corneitis, and ophthalmia tarsi, and in November 1828, published some account of its beneficial effects in those diseases, in the Glasgow Medical Journal.

In the course of the same year, Mr Wallace of Dublin published, in the 14th volume of the Medico-Chirurgical Transactions, a favourable account of the effects of cinchona, in cases of iritis occurring after typhus fever.

[10] Noble's Treatise on Ophthalmy, p. 209; Birmingham, 1801. Vetch, in Medico-Chirurgical Transactions; Vol. xvi. p. 357; London, 1830.

[11] Though the effect of certain vegetable substances in dilating the pupil, was known to the ancients, and advantage taken of it, (as Pliny informs us in the 13th chapter of the 25th book of his Natural History,) in operating on the eye, the application of such substances for the purpose of combating the contraction of the pupil which is apt to occur in iritis, appears altogether modern. Indeed, I am not aware that Darwin (Zoonomia, Vol. iii. p. 132; London, 1801,) was preceded in the suggestion, that the power of belladonna in dilating the pupil, might be of advantage in some ophthalmiæ.

[12] Ammon's Zeitschrift für die Ophthalmologie; Vol. i. p. 417; Dresden, 1831.

[13] Transactions of the Association of Fellows and Licentiates of the King and Queen's College of Physicians in Ireland; Vol. iv. p. 257; Dublin, 1824.

[14] Review of the different Operations performed on the Eyes, p. 60; London, 1826.

[15] London Medical and Physical Journal for September 1828.

[16] London Medical and Surgical Journal for October 1831, p. 325.

[17] Walker, in Lancet for 1830–1; Vol. ii. p. 619. Julliard, Op. Cit. p. 73.

SECTION III.—OBJECTIVE AND SUBJECTIVE SYMPTOMS OF THE OPHTHALMIÆ.

A tolerably correct notion may in general be formed of the kind of ophthalmia which is present, either, in the first place, by looking at the inflamed eye, and particularly by observing the arrangement of the enlarged blood-vessels, without hearing the patient's account of his sensations, or, in the second place, by learning from the patient the kind of pain with which he is affected, without looking at the eye. Of course, before proceeding to treat any particular case, we avail ourselves of all the symptoms, both *objective* and *subjective*, both what are offered to the direct examination of our own senses, and what we must receive on the testimony of the patient.

§ 1. *Arrangements of the Blood-vessels.*

We meet with four arrangements of the external vessels, in the ophthalmiæ; namely, the *reticular*, the *zonular*, the *fascicular*, and the *varicose*.

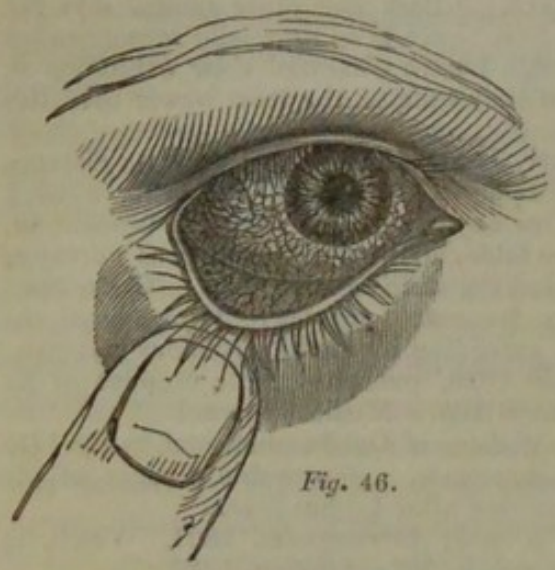

Fig. 46.

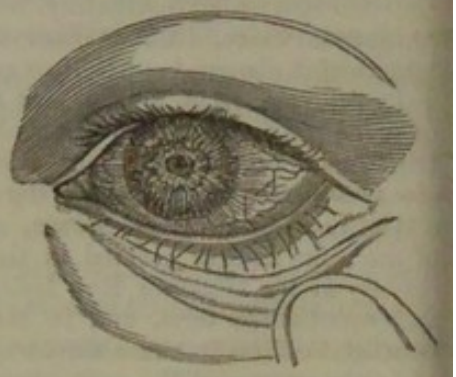

Fig. 47.

1. The network observed in the first of these arrangements, (*Fig.* 46.) is seated in the conjunctiva, the vessels by which it is formed are comparatively large, and tortuous, they anastomose freely with one another, and can be shoved or drawn aside, by pressing or dragging the eyelids with the finger. This arrangement resides in the superficial conjunctival network, and is characteristic of puro-mucous conjunctivitis.

2. In zonular inflammation, (*Fig.* 47.) the vessels are small and hair-like, they are never very tortuous, but run like radii towards the cornea, thus forming not a network, but a halo, over which the conjunctiva is easily made to slide. This arrangement resides in the deep-seated conjunctival network, and belongs to sclerotitis and iritis.

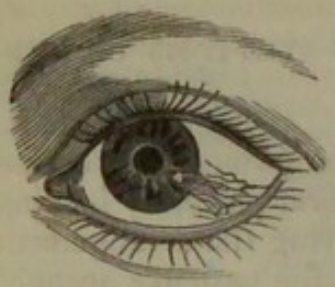

Fig. 48.

Fig. 49.

3. In the preceding arrangements, the enlarged vessels are spre

pretty equally over the eyeball; but in the fascicular, (*Fig.* 48.) the redness commonly occupies only one side of the eye, and often consists of a few vessels only, running towards the cornea, and terminating in a phlyctenula or pustule. This arrangement, then, belongs to the scrofulous varieties of conjunctivitis.

4. Large tortuous vessels, derived from those belonging to the recti muscles, constitute the varicose arrangement, (*Fig.* 49.) which we meet with most frequently in the chronic stage of arthritic ophthalmia, and in choroiditis. The vessels in question are branches of one or other of the seven trunks, which, advancing towards the cornea, are visible in every eye; namely, one from the rectus externus, and two from each of the other recti.

These four arrangements of vessels are, in general, perfectly distinct; but, in some cases, they are mixed together, or are obscured by what is termed *chemosis*, that is, an inflammatory œdema of the cellular substance under the conjunctiva, so that this membrane is raised from the sclerotica, and so much swoln as sometimes to overlap the edge of the cornea, or even protrude from between the eyelids. When chemosis is present, nothing can be seen of the particular distribution of the vessels. In the compound ophthalmiæ, again, such as the catarrho-rheumatic, pustulo-catarrhal, &c. two or more of the arrangements may be combined.

§ 2. *Kinds of Pain.*

Two different varieties of pain attend the ophthalmiæ, the one being characteristic of the inflammations of the conjunctiva, the other of those affecting the sclerotica and iris. The former is uniformly compared by the patient to the feeling which is produced by sand in the eyes, it is most felt during the day, and especially in the morning, when the eyes begin to be moved; the latter is pulsatory, affects the circumorbital region as much as the eye itself, and is strikingly nocturnal, commencing after sunset, increasing in violence till after midnight, and abating towards sunrise, scarcely felt during the day, but returning about the same hour in the evening as when it commenced. Ophthalmiæ attended by the conjunctival or sandy pain only, are generally curable by external applications; those which are accompanied by the circumorbital or pulsatory pain, always require venesection.

SECTION IV.—PURO-MUCOUS CONJUNCTIVITIS[1] IN GENERAL.

The muco-cutaneous membrane which lines the eyelids and invests the anterior surface of the eyeball, is occasionally affected with inflammation, like that by which the other parts of the mucous system are commonly attacked, namely, a puro-mucous, blenorrhœal, or catarrhal inflammation; in other cases, it is affected with diseases

evidently partaking of the nature of cutaneous eruptions. The conjunctiva thus resembles the membrane of the fauces, which sometimes is affected with catarrhal, and at other times with aphthous inflammation; or the continuation of the lining membrane of the urethra over the glans penis, and inside the prepuce, which in one case we see affected with a species of gonorrhœa, and in another with pustular or herpetic eruptions.

There are certain symptoms characteristic of the genus *conjunctivitis puro-mucosa*, whether it arise from the influence of a cold and moist atmosphere, or from contagion, and whether the contagion be derived from the eye of another person, or from the application of puriform matter from other quarters, as that of leucorrhœa or gonorrhœa. All these are capable of exciting puro-mucous conjunctivitis, and the last mentioned causes produce a much more severe disease than the first. The symptoms of puro-mucous conjunctivitis are analogous to those which attend the blenorrhœal or purulent inflammations of other mucous membranes, as of the Schneiderian membrane in catarrh, or the lining of the urethra in gonorrhœa. The most striking character of this genus is, no doubt, the puriform discharge. I need scarcely say that the pus is secreted by the conjunctiva; it is merely an increased and changed discharge of mucus, and not the effect of ulceration. It is also almost superfluous to mention, that the inflammation of the conjunctiva, although peculiar, is still sufficiently distinct, and that we should form an erroneous idea of the diseases which I am now about to consider, were we to regard any of them as a mere flux of humours, and not as inflammatory affections.

Puro-mucous ophthalmia, from whatever cause it originates, commences in the conjunctiva, and is at first confined to that tunic; but in severe cases, the other textures, and especially the cornea, are apt to suffer, and thus the eye may be destroyed.

Puro-mucous conjunctivitis presents four stages. The *first*, which is generally so short as to pass unobserved, is the stage of pure inflammation. The *second* is marked by puriform discharge, and is often attended by chemosis, and swelling of the eyelids. In the *third*, the cornea becomes affected, growing opaque, being infiltrated with pus, and more or less deeply destroyed by ulceration, so that the front of the eye is apt to give way, and the case to end in staphyloma. I have been led to attribute the destruction of the cornea in the puro-mucous ophthalmiæ, not entirely to a vital, but partly to a mechanical cause; not altogether to excessive inflammatory action in the cornea itself, but partly to the pressure caused by the enormously distended conjunctiva of the eyelids and eyeball. Other causes no doubt, concur, in the puro-mucous inflammations of the conjunctiva, to produce opacities of the cornea, detachment of its conjunctival covering, and ulceration; and, in particular, the maceration of the cornea in a flood of purulent fluid, not sedulously removed by lotions or injections. But the destruction of the cornea by infiltration of pus and sloughing, I am disposed to refer in no small degree to the

pressure of the chemosed conjunctiva, and the consequent mechanical death of the cornea. A circular groove of ulceration all round the cornea, at the place pressed on by the chemosed conjunctiva, is a frequent occurrence. In the *fourth* stage, which may continue for an unlimited space of time, the papillary structure of the palpebral conjunctiva becomes hypertrophied, presenting a granular or sarcomatous appearance. The lids, in this state, rubbing on the cornea, keep this part of the eye in a vascular and nebulous state. Worn out by the pain and irritation of the disease, the patient is apt at last to become hectical, and almost quite incurable.

A treatment, partly antiphlogistic or soothing, and partly stimulating or smarting, is the most successful in the cure of all the puro-mucous ophthalmiæ.

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[1] *Lippitudo* of Celsus.

SECTION V.—CATARRHAL OPHTHALMIA.

There are three ophthalmiæ, which are frequently excited, especially in adults, by atmospheric influences; namely, the *catarrhal*, the *rheumatic*, and the *catarrho-rheumatic*. The first of these is a puro-mucous or blenorrhœal inflammation of the conjunctiva; the second, an affection of the fibrous sclerotica; while in the third, both the conjunctiva and sclerotica are attacked, the symptoms of catarrhal being united to those of rheumatic ophthalmia.

Symptoms. The inflammation in the catarrhal ophthalmia, which is by far the most common disease of the eye in adults, is almost entirely confined to the conjunctiva and Meibomian follicles. The symptoms are redness and swelling of the internal surface of the eyelids, reticular redness of the sclerotic conjunctiva, sandy pain, and adhesion of the eyelids in the morning.

1. The conjunctival secretion is increased in quantity, and occasionally becomes opaque, thick, and puriform; but in many cases remains transparent, its superabundant quantity giving to the eye an appearance of more than usual moistness, and communicating to the patient a feeling of glueyness; while the Meibomian secretion, also increased in quantity and changed by disease, concretes on the edges of the lids and amongst the eyelashes, and binds them together during the night.

2. In mild cases, the redness is chiefly in the conjunctiva lining the eyelids. On the white of the eye, the vessels are arranged in a network (*Fig.* 46.); and can be moved in every direction, by pressing the eyelid against the eyeball with the finger, showing that they reside in the conjunctiva. Not unfrequently we observe spots of extravasated blood beneath the conjunctiva, or even a pretty general but slight ecchymosis. In severe cases, chemosis takes place, even

to a great extent; so much so, that if only general treatment be employed, as blood-letting and purging, while local means are neglected, the cornea may lose its vitality, ulcerate at its edge, become infiltrated with pus, burst, and slough, and thus vision be destroyed.

3. In catarrhal ophthalmia, the patient uniformly complains of a feeling of pricking or roughness of the eye, or as if sand, hot ashes, or broken glass was under the upper eyelid; a sensation which never attends the pure rheumatic ophthalmia, and may therefore be regarded as strikingly diagnostic. So distressing, even at the beginning of an attack of catarrhal ophthalmia, is the sensation as if sand or some other foreign body were under the upper eyelid, that I have repeatedly been requested to visit patients, in whom this disease was commencing, who supposed that some particle of dust had actually got into that situation; and in one instance I was called in the night to visit a medical gentleman, who was so convinced, from the feelings which he experienced, that this was the case, that he had made various attempts, with his dressing probe, to free himself from the imaginary offending substance. The cause of the sandy pain is the rubbing of the very sensitive eyelids over the enlarged vessels of the sclerotic conjunctiva.

The exacerbation in catarrhal ophthalmia is in the evening, and is attended with itchiness of the eyes and photophobia, but is relieved by going to bed, and the patient sleeps, in general, without interruption during the night. The pain is renewed when the patient attempts to use the eyes in the morning, owing to the motion of the inflamed surfaces. In the catarrhal ophthalmia, the patient is generally free from headach; whereas in the rheumatic, one of the most remarkable symptoms is supra-orbital or circum-orbital pain, severely aggravated during the night, the exacerbation in this disease being from 6 P.M. till 6 A.M. When headach does attend catarrhal ophthalmia, it is seated across the forehead, as if in the frontal sinuses, and is felt most in the morning.

4. Catarrhal ophthalmia is often attended by the common symptoms of inflammation of the lining membrane of the nostrils, fauces and trachea. In the other cases, the symptoms being confined to the eye, the disease is a simple mucous conjunctivitis.

Causes. Atmospheric changes, and especially exposure to cold and wet, are the chief exciting causes of catarrhal ophthalmia. Night watching, and exposure to the night air, after being much heated or in a state of intoxication, frequently give rise to the disease. Sailors, soldiers on board transports, and others on board ship, are often attacked by it, especially those who sleep near a port-hole or open hatchway; also soldiers in hospital, especially those who sleep near the door, a window, or any apertures admitting a draught of air. Wet feet is a cause which some of my patients have particularly mentioned. A delicate female was violently attacked with the disease in both eyes, in consequence of riding outside a stage-coach from Edinburgh to Glasgow. Another lady owed her first attack

to bathing in the sea; and for many months was liable to a relapse on any slight exposure, or over-exercise of the sight. Reading or writing to a late hour in the night, sometimes brings on catarrhal ophthalmia, or what we should rather call simple mucous conunctivitis. If those who have become long-sighted from age, read or write without glasses, this disease is apt to be the result. An individual who has once laboured under catarrhal ophthalmia, is more likely to be attacked again; one of my patients had three attacks between May and January.

Epidemic. In many instances, catarrhal ophthalmia has been known suddenly to attack about the same time a great number of persons, who happened to be exposed to the same general exciting causes. Assalini, for example, relates, that in May 1792, several battalions of the Duke of Modena's troops arrived at Reggio, to quell some riots. These troops passed the first night after their arrival, under the spacious porticoes of a convent looking to the north, in the lowest part of the town, and near the trenches of the citadel. Many of the soldiers contracted a violent catarrhal ophthalmia, which was attributed to the dust of the straw on which they had slept, and not to the moist and cold air of the place, which no doubt was the true cause, and which was so much the more likely to prove hurtful, as these men had been accustomed to close and comfortable quarters.[2]

Catarrhal ophthalmia has been known to spread itself still more extensively, attacking a great proportion of the inhabitants of a town or district, so as to obtain the name of *epidemic ophthalmia.* In 1778, it attacked the whole neighbourhood about Newbury, in Berkshire; and, in the same year, it prevailed in several of the English camps, where it was known by the name of the *ocular disease.* In 1806, an epidemic ophthalmia of this kind prevailed in Paris, and was, in many instances, attended by an affection of the mucous membrane of the air-passages; a complication which I have repeatedly observed in the sporadic cases of this country. The same disease prevailed in 1808, at Vicenza, in Italy. It has been mentioned by some authors, that this disease is more common in summer and autumn. In Glasgow and its neighbourhood, it is common at all seasons; but most abundant during cold wet weather, or when the east or north-east wind prevails.

In Egypt, many circumstances favour the rise and continuance of puro-mucous ophthalmia; such as, her low plains, sandy deserts, the lakes, as in the neighbourhood of Alexandria, and the dazzling glare, reflected from the uniformly white surface, which every object presents. On European armies, in that country, the high temperature, and the heavy night-dews, must have operated unfavourably, as well as the minute particles of hot sand which float in the air, and are raised by the slightest breeze. Although epidemic, and excited by atmospheric causes, in the first instance, it appears afterwards to become contagious, and in the aggravated form constitutes the Egyptian or contagious ophthalmia.

Prognosis. If catarrhal ophthalmia be neglected, or treated only with general remedies, or with improper local ones, it will continue for many weeks, and become the cause of much febrile excitement and constitutional illness, as well as local distress and danger. Amongst other bad effects of neglect, the conjunctiva, particularly where it lines the upper eyelid, becomes sarcomatous and rough, and by rubbing in this state, against the cornea, brings on a vascular and nebulous state, or, it may be, even a dense white opacity, especially of the upper half of the cornea. The discharge from the conjunctiva is more apt, also, under neglect or improper treatment, to become puriform, and to assume the power of propagating the disease by contact.

Contagiousness. I regard it as scarcely admitting of doubt, that the discharge in catarrhal ophthalmia, especially when distinctly puriform, if conveyed from the eyes of the patient to those of others, by the fingers, or by the use of towels and the like in common, will excite a conjunctivitis still more severe, more distinctly puriform, and more dangerous in its effects on the cornea, than was the original ophthalmia. This is the conclusion to which I have arrived, from the observation of many instances, in which, as far as it was possible to come to the facts, this disease having arisen in one member of a family from atmospheric exposure, several others of the family have become affected without any such exposure that could be ascertained; and while, in the first affected, the disease was comparatively mild, and scarcely puriform, in the latter the symptoms were more violent, and the discharge thick, abundant, and opaque.

I think it probable, that the ophthalmia which attacked the British and French armies in Egypt was an atmospheric puro-mucous conjunctivitis, but that it afterwards degenerated into a contagious, perhaps infectious, disease; that is to say, that it was propagated by actual contact of the discharge, and perhaps by miasmata from the eyes floating through the air. Nor is this idea inconsistent with what is generally admitted regarding contagious and infectious diseases. If we admit such a thing as contagion or infection at all, we must also admit, I should apprehend, that diseases, originally excited by external influences, are propagated only in the second and succeeding instances, by their contagious or infectious power.

I know of no experiments in which the discharge from an eye affected with simple catarrhal ophthalmia, or puro-mucous conjunctivitis arising from atmospheric influence, has been applied to a sound eye. Dr Guillié's experiments, indeed, may have been performed with matter of this description. He took the puriform mucus from the eyelids of some children affected with puro-mucous conjunctivitis, in the Hospital for Sick Children at Paris, and introduced it under the eyelids of four children belonging to the Institution for the Blind. These children were amaurotic, but the external surface of their eyes was healthy and entire. In all four a regular puro-mucous conjunctivitis was produced.[3] Mr Mackesy

relates[4] some experiments, in which he applied the discharge, taken from the eyes of four soldiers, to his own, without producing any inflammation. The men from whom the matter was taken appear to have been labouring under catarrhal ophthalmia, but the application to the conjunctiva was probably insufficiently accomplished, Mr Mackesy satisfying himself principally with keeping a piece of linen, imbued with the discharge, laid upon his eyelids.

In the next section, I shall have occasion to refer to one or more striking instances of catarrhal ophthalmia spreading apparently by contagion.

Treatment. Catarrhal ophthalmia yields readily to a very simple treatment, chiefly of a local stimulating kind. I was first struck with the truth of this fact in the successful management of this disease by Professor Beer, at Vienna, in 1817; and I was confirmed in this view, by an attentive consideration of the cases detailed in an excellent Report by Mr Melin, published in the London Medical and Physical Journal for September 1824. The results of my own practice, both in private and at the Glasgow Eye Infirmary, some account of which I submitted[5] to the profession in 1826, have amply borne me out in the belief, that general remedies in this disease are inferior in importance to local ones; that violent general remedies are worse than useless; and that a local stimulant treatment may generally be relied on.

1. The feeling of sand in the eye is uniformly relieved, and the inflammation abated, by the use of a solution of nitrate of silver, a remedy of sovereign utility in the puro-mucous inflammations of the conjunctiva, and without which these diseases would often prove destructive to vision. The solution which I generally employ contains 4 grains of the nitrate in 1 ounce of distilled water. A large drop is to be applied to the eye once, twice, or thrice a-day, according to circumstances, by means of a pretty thick camel-hair pencil. For a minute or two after the drop is applied, nothing particular is felt. The eye then begins to be affected with pricking pain, which, when the inflammation is acute, becomes pretty smart, continues for perhaps 10 minutes, and dies away; after which the eye feels much easier than it did before the drop was applied. In particular, the feeling of sand and tendency to lacrymation are much relieved. The eye continues easy for perhaps five or six hours, when the symptoms again return, and ought immediately to be checked by the application of another drop. As the disease subsides, the remedy gives less and less pain, till at last it is scarcely felt. I have sometimes alarmed other practitioners, by proposing to drop upon the surface of an eye highly vascular, affected with a feeling as if broken pieces of glass were rolling under the eyelids, and evidently secreting puriform matter, a solution of lunar caustic; and I have been not a little pleased and amused at their surprise, when, next day, they have found all the symptoms much abated by the use of this application. If the patient is of a torpid constitution, and the discharge from the conjunctiva copious, a stronger, or even a satur-

ated solution may be used, or recourse may be had to a nitrate of silver salve, of from 10 to 20 grains to the ounce of fatty matter, or to red precipitate salve of the strength of 60 grains to the ounce.

2. As a collyrium, I am in the habit of employing a solution of 1 grain of corrosive sublimate, and 6 grains of muriate of ammonia, in 8 ounces of water, to which are added 2 drachms of vinum opii. Being made milk-warm, it is to be used thrice a-day for fomenting the eyelids, by means of a linen rag, or piece of soft sponge. In mild cases, a few drops are then allowed to flow in upon the eye; but, in severe cases, in which the discharge is copious and puriform, this collyrium must be injected over the whole surface of the conjunctiva, and especially into the upper fold of that membrane, by means of a syringe, so that the morbid secretion may be entirely removed, and the diseased membrane touched immediately by the solution.

3. At bedtime, about the size of a hemp-seed of red precipitate ointment, melted on the end of the finger, is to be smeared along the edges of the eyelids. The ointment must be prepared in the manner specified at page 146.

4. I rarely find it necessary to take away blood in catarrhal ophthalmia, either from a vein or by leeches. When there is more than ordinary constitutional irritation, the taking away of from 12 to 20 ounces of blood from the arm, will no doubt prove useful; but this will rarely be necessary if the disease has not been neglected for a number of days or mistreated. If the local symptoms do not speedily yield to the remedies already mentioned, a dozen of leeches may be applied round the eye.

5. Scarification of the conjunctiva of the eyelids is necessary only in cases in which there is some degree of chemosis, and a distinctly puriform discharge. In such cases, it proves a valuable means of cure, if performed according to the directions given at page 360.

6. A brisk dose of calomel and jalap may be ordered at the commencement, with occasional doses of neutral salts during the course of the disease.

7. Determining to the skin is also useful. This may be done by the warm pediluvium at bedtime, small doses of spiritus Mindereri, or of any other mild diaphoretic, in combination with diluent drinks, and rest in bed.

8. In severe cases, a blister to the back of the neck will be found useful, or blisters behind the ears, kept open.

9. Though the sclerotic conjunctiva has become free from redness, it is not to be supposed that the inflammation is completely subdued. It is probable that the palpebral conjunctiva still remains in an injected state. The inside of the eyelids, and especially of the upper eyelids, ought daily to be inspected. If there is any tendency to a rough and sarcomatous state of the conjunctiva, it ought to be alternately scarified, and touched with the solid sulphate of copper or nitrate of silver, as I shall explain more particularly under the head of *Granular Conjunctiva*.

I have treated many hundred cases of catarrhal ophthalmia according to the plan above detailed, and with uniform success. In almost no case, (indeed, I may say in no case where scrofula did not modify the symptoms,) in which the above simple remedies were had recourse to previously to ulcer or opacity of the cornea, did any ulcer or opacity ever occur; nor did the symptoms ever fail speedily to subside. On the other hand, I have repeatedly had occasion to see cases of this disease which had been much aggravated by trusting altogether to general treatment, and especially to bleeding; or by the use of acetate of lead, or sulphate of zinc, as local applications.

Modified by scrofula. Catarrhal ophthalmia occurring in scrofulous habits, and especially in children of that constitution, is very liable to degenerate into the phlyctenular ophthalmia, hereafter to be described. The scrofulo-catarrhal is one of the compound ophthalmiæ, which are apt to prove puzzling to the inexperienced practitioner. The treatment, in cases of this sort, must partake of the remedies above mentioned, and of those hereafter to be recommended for scrofulous conjunctivitis.

Complication. Catarrhal ophthalmia is often complicated with pustular conjunctivitis. Pustules rise round the edge of the cornea; they are flat, of considerable size, and filled with a yellowish transparent fluid; they burst, and leave superficial ulcers, which readily heal, without leaving any visible cicatrices. This complication does not require any particular change in the treatment.

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[1] *Conjunctivitis puro-mucosa catarrhalis. Ophthalmia purulenta mitior.*
[2] Manuale di Chirurgia; Parte ii. p. 117; Milano, 1812.
[3] Bibliothèque Ophtalmologique; Tome i. p. 81; Paris, 1820.
[4] Edinburgh Medical and Surgical Journal; Vol. xii. p. 411; Edinburgh, 1816.
[5] Medical and Physical Journal; Vol. lvi. p. 327; London, 1826.

SECTION VI.—CONTAGIOUS OPHTHALMIA.[1]

The disease now to be considered is essentially the same with that described in the last section, only much more severe, and although in the first instance excited in a similar way, namely, by exposure to atmospheric alternations, propagated in the second and succeeding cases, by contagion, and perhaps by miasmatic infection. It is a common and most afflictive disease in warm climates, as Egypt, Persia, and India. From having passed, along with the British troops from Egypt to this country, in 1800, 1801, and 1802, it is often spoken of under the name of the *Egyptian ophthalmia.* It is rarely seen in private life; but is generally met with in armies, on board ship, or in large public schools. It may arise in any climate or region of the earth, and is not the effect of a specific principle or virus, imported from Egypt.

Symptoms. These succeed each other with different degrees of

rapidity, and present very different degrees of severity, in different individuals who are suffering at the same time, in the same place, and from the same infection. These differences depend on the constitution of the patients, on their state of health when they become affected, and upon incidental and minute circumstances of situation. In women, for instance, the disease is said to be milder than in men. It has also been remarked, that as the age is near to puberty, on either side, the disease is in general more fatal in its effects. In scrofulous persons, it is always tedious, and more likely to destroy the cornea.

The disease is also much more severe in one instance of its occurrence than in another. In 1806, it raged with greater rapidity and severity in the 54th than in the 52d regiment. It never was so severe in the Military Asylum at Chelsea, as in the latter regiment. It appears to have been much more severe in the Military Asylum in 1809 than in 1804. These differences appear to be owing to the climate and situation where the disease occurs, the temperature, the season of the year, and other general causes.

The purely inflammatory stage of this disease, though often shorter in its duration, appears never to surpass 30 hours. At the end of that time, purulent matter is always formed by some portion of the conjunctiva. In most cases, the purely inflammatory stage is so slight and rapid, as not to come under the observation of the surgeon. So early does the formation of purulent matter take place, that even when the inflammation has extended no farther than the palpebral conjunctiva, pus is seen on everting the eyelids, although its quantity is not yet sufficient to be observed unless this mode of examination be adopted.

The disease appears to commence soon after the application of the contagious or infectious matter to the conjunctiva, but in many cases it advances to the secretion of purulent matter, before the patient is aware that he is affected. It often happens that he makes no complaint till his attention is excited by finding his eyelids adhering in the morning, or till the sensation of some extraneous body in the eye has become distressing. A sudden attack of darting pain through the eyeball or in the forehead, is sometimes the first thing which attracts his attention, while in other cases, the disease advances till there is such vascularity of the conjunctiva as cannot fail to be observed by others. In all these cases, the disease has unquestionably existed for some time, but it has been unobserved by the patient himself, or if observed, concealed. When this disease breaks out in a family, or in any larger community of individuals, those first attacked, ignorant of the previous existence of the disease in others from whom they might have received it, and ignorant of its nature, will seldom demand advice till urged by the violence of the symptoms. When once the plan is adopted, as it should always be, of daily inspecting the *healthy* individuals of any community in which the disease is likely to appear, it will be the fault of the surgeon if he ever meets with a new case in which the disease

is so far advanced as to be attended with any other symptom than an increased vascularity of the conjunctiva of the eyelids.

The right eye is more frequently attacked by this disease than the left. It is also, in general, more severely affected, and the sight of it is more frequently lost. In some instances only one of the eyes takes the disease, but, commonly, both suffer from it, although there is often an interval of several days before the second becomes inflamed.

When the symptoms succeed each other with moderate rapidity, the following is the order in which they appear.

A considerable degree of itching is first felt in the evening, or suddenly there arises in the eye the feeling as if a particle of dust were between the lids and the eyeball. This is succeeded by a sticking together of the lids, principally complained of by the patient on awakening in the morning. The eyelids appear fuller externally than they ought to do. Their internal surface is inflamed, being tumefied and highly vascular; and the semilunar membrane and caruncula lacrymalis are considerably enlarged and redder than usual. The swelling of these parts is soft, somewhat elastic, slippery, and easily excited to bleed.

We have here all the symptoms of the purely inflammatory stage, and even the symptoms of commencing suppuration. The itching, which is one of the earliest symptoms, indicates a suppression of the natural mucous secretion of the conjunctiva of the eyelids, and of the Meibomian secretion. Such suppression appears to be the constant and earliest effect of inflammation upon every mucous membrane, and secreting organ of the body. In the course of a few hours, a thin acrid secretion takes place from the conjunctiva. This gives the slipperiness to the internal surface of the eyelids; and the Meibomian secretion being now increased above its usual quantity, concretes among the eyelashes, and causes the eyelids to adhere during sleep. The sensation of sand in the eye is owing merely to the dilated state of the conjunctival vessels.

In about 24 hours after the first symptoms make their appearance, the mucous discharge from the internal surface of each eyelid is considerable in quantity. It is still thin, but somewhat viscid, and begins to be opaque. It lodges at the inner angle of the eye. On everting the lids, their internal surface is observed to be much more vascular and tumid. The patient is troubled with epiphora, especially when he exposes his eye to a current of air. He complains of a sensation as if the eye were full of sand, but seems to experience little uneasiness from the light, unless he be of a scrofulous habit, when the intolerance is acute. Not unfrequently, a considerable discharge of blood takes place from the conjunctiva, after which the swelling of the membrane diminishes for a time. This is sometimes repeated several times before the profuse puriform discharge sets in. It does not appear to arise from the rupture of vessels, but rather to come from the exhalents of the conjunctiva, dilated by red blood.

The inflammation now extends to the whole internal surface of the eyelids. The secretion from the palpebral conjunctiva is much augmented, and becomes more distinctly puriform, being yellowish and thick. In many cases it is so abundant, that on the patient opening his eyes, the matter instantly flows over the cheeks. It irritates the skin and even excoriates it. The swelling of the conjunctiva of the lids, and especially of the upper, increases with the discharge; partly from a serous effusion immediately under the membrane, partly from an inflammatory development of its papillary structure, giving rise to a sarcomatous appearance of the internal surface of the eyelids.

The disease may not proceed farther over the conjunctiva, but remain in the state described for weeks or even months, and however severe it may appear to another person, give but little uneasiness to the patient. The purulent secretion may then diminish, and recovery gradually take place.

In other cases, the inflammation spreads rapidly to the conjunctiva of the eyeball. Its vessels are distended with red blood, forming a thick network over the sclerotica, interspersed, in some instances, with small spots, from extravasation. The membrane itself becomes speedily thickened, its semilunar fold is enormously enlarged, and a serous effusion taking place into the cellular membrane which connects the conjunctiva to the sclerotica, the former is raised so as to form a soft pale-red elevation or chemosis. In some cases, this inflammatory œdema exists only at particular spots, though the increased vascularity of the conjunctiva is considerable and extends even to the cornea. It commonly happens that the chemosis gradually spreads from the lids over the surface of the eye towards the cornea, with its advancing edge accurately defined, leaving for a while a circle round the cornea. Gradually the swelling intrudes on the cornea, till it closely surrounds it, and at last completely buries and overlaps it, so that even its centre can scarcely be perceived. The chemosis is sometimes so great, that the conjunctiva of the eyeball protrudes considerably from between the lids.

The chemosis is accompanied by livid redness and swelling of the skin of the eyelids, sometimes extending to a considerable distance from the eye, and resembling very much in colour and general appearance the redness and swelling which surround the cow-pox pustule between the 9th and 12th days after inoculation. This swelling of the lids is often as sudden in its appearance, as if it had been owing to the stinging of an insect, or some other immediate irritation. It sometimes continues to increase almost by sensible degrees, and attains its utmost height in a few hours; at other times, it increases gradually during several days. It affects chiefly the upper lid, which often reaches a very great size, completely overhanging the lower, so as to render it difficult to obtain access to the eye for examination.

The sudden swelling of the lids renders them almost quite immovable. It also occasions at first a degree of inversion from

the cartilages not yielding with facility; but after a time, the lids are apt to become everted, as has been explained at page 187. This happens especially to the lower, but occasionally to the upper also. The sensations produced by this enlargement of the external parts of the eye are by no means severely painful, scarcely surpassing a sense of stiffness and weight, along with a feeling of uneasiness occasioned by the accumulation of matter secreted by the conjunctiva, which flows in great abundance on raising the lids. The sensation of gravel in the eye is now less troublesome. If light be excluded, and the eyes kept at rest, the patient does not complain much of pain.

After the conjunctiva of the eyeball takes part in the disease, the secretion of puriform fluid is greatly increased, varying, however, from time to time, in quantity, colour, and consistence, as does the discharge in gonorrhœa. Dr Vetch estimates its quantity as exceeding several ounces in the day. It partly escapes from between the lids, partly lodges in their folds, and in the pit formed over the cornea by the chemosed conjunctiva. In this last situation, the purulent discharge is sometimes allowed, from carelessness, to remain so long, that it assumes the appearance of a thick membrane, so that one unacquainted with the symptoms, on seeing this piece of matter drop from the eye, is apt to suppose that the whole organ is destroyed, and that it is the cornea itself in the state of a slough which has separated.

The puriform secretion may continue without much change for 12 or 14 days, or even a longer period. At length the chemosis, which for a time filled up completely the space which exists in the healthy state between the eyeball and the eyelids, begins to shrink, and the fluid secreted to diminish in quantity, and gradually to lose the characters of pus, becoming thin and gleety. The internal surface of the eyelids, the semilunar membrane, and caruncula lacrymalis, which were the parts first affected, are the last in which the disease disappears. The internal surface of the lids generally remains in a sarcomatous state, from the morbid condition of the papillary structure of the conjunctiva. The papillæ, instead of subsiding to their natural size, become indurated, and form a granular, scabrous, or mulberry surface; and this, constantly rubbing against the cornea, keeps up a chronic inflammation in its investing membrane, which becomes covered with red vessels, and loses in a great measure its transparency.

Such may be looked on as a favourable case of the disease. We must be prepared to meet with much more destructive terminations of it. It often happens, indeed, that the tumefaction of the conjunctiva and whole substance of the lids is so great, that we cannot ascertain the morbid changes which are going on in the eye. When this tumefaction declines, so as to admit of the eye being examined, we sometimes find it disorganized. The cornea presents itself in various states; for example, turbid, but entire, burst in one or more points, almost entirely destroyed by suppuration, sometimes of a

fleshy appearance, covered with fungous excrescences, or penetrated by numerous ulcerations, through which portions of the iris protrude.

We have reason to conclude, that, in some cases, the primary inflammation extends to the cornea. Its conjunctival covering becomes thickened, and more or less opaque. The patient's vision is much diminished by these changes; and very frequently the opacity and consequent diminution of vision continue after all the acute symptoms of the disease have disappeared. Superficial ulceration frequently attacks the cornea in the course of this disease, giving rise to opaque cicatrices of various sizes, and often producing a partial flatness, or rendering the cornea irregular on its surface, and permanently unfit for distinct vision. Even when the ulceration has not penetrated through the cornea, the iris sometimes advances and adheres to its internal surface, opposite to the ulcerated part.

In other cases, the inflammatory process is still more severe, attacking the whole substance of the cornea, and even extending to the internal textures of the eye. The patient is now subject to sharp lancinating pain deep in the orbit, aggravated during the night, and declining towards morning. There is also deep-seated pulsative pain in the eye, coming on sometimes in paroxysms, in other instances continuing with scarcely any remission in its violence till the cornea gives way. The varieties, indeed, in regard to the pain, are exceedingly remarkable, depending no doubt in a considerable measure on the part which the several textures of the eye take in the disease. For the most part, the attacks of pain are sudden. Occasionally they are preceded by chilliness and slight nausea, or by a peculiar sensation about the head. Frequently the pain, with a remarkable increase of heat, occurs around the orbit, in a degree no less excruciating than in the eye itself. The space over the frontal sinuses, the temples, and the face, are its frequent seats, or to speak more correctly it affects the branches of the fifth nerve, distributed to those parts. Sometimes it occurs immediately above the eye, commencing about the supra-orbitary foramen. This supra-orbital, or circum-orbital pain is indicative of the inflammation extending to the sclerotica, cornea, choroid, and iris. Inflammation of these textures always excites sympathetic pain in the fifth nerve. The pain round the eye is aggravated by pressure, and occasionally a circumscribed swelling suddenly takes place over the part affected. When such a swelling appears in the face, it partakes of an œdematous nature, and though equally sudden in its accession, does not subside so rapidly during an intermission, as the swellings which rise under the same circumstances on the forehead and temple. At all times, the eye is the most frequent seat of the pain, which is generally described to be of a darting or shooting kind. Sometimes it is compared by the patient to what might be felt if the eye were stuck full of needles, and always appears to be exceedingly severe. It is generally confined to one eye at a time, though it frequently shifts from the one to the other.

The apparent absence of all uneasiness from the presence of light, during the paroxyms, is probably owing to the patient's attention being engrossed by the violence of the pain. The duration of the paroxysms, and their recurrence, do not observe any great regularity. The more common duration appears to be from three to four hours. Sometimes they do not continue longer than two hours, and sometimes they extend to six. They appear to come on most frequently from 10 to 12 in the evening. During the pain, the secretion of tears is more copious, and the purulent discharge, on the contrary, almost uniformly diminished.

This intermittent type of the pain is a remarkable circumstance, and might appear inexplicable, were we not acquainted with the fact, that pain in and round the eye, aggravated during certain hours of the night, is an invariable attendant on sclerotitis. It has already been mentioned, that in many cases there is no entire intermission, and scarcely any remission in the violence of the pain. Dr Vetch (to whose excellent account of the disease I am indebted for many of the facts stated in this section) tells us, that in those patients who were of a habit particularly robust, or who had been exposed to some strongly exciting cause, or who were of a shape favourable to a determination to the head, there was no entire intermission, and scarcely ever any remission in the violence of the pain.[2]

It is only when the disease assumes its most violent form that it is accompanied by the frequent occurrence of the paroxysms of pain above described, and under these circumstances the rupture of the cornea frequently takes place, an event which is almost always followed by staphyloma and loss of sight. The period at which this happens varies exceedingly in different patients. In some these paroxysms have occurred daily, during a number of weeks before rupture of the cornea is produced. In others, this is effected under the second or third attack, and gives a temporary relief. I say *temporary*, for even the rupture of the cornea does not afford a termination to the disease, and often scarcely checks its progress. The severe pain is seldom present in both eyes at the same time, and although it occasionally happens that the attacks of pain alternate from the one eye to the other, the rupture of the one is generally produced before the severe pain affects the other. In some cases, where both eyes are destroyed by rupture of the cornea, the patient has no recurrence of the pain for some time after the rupture of the first; while in other cases, the pain almost instantaneously shifts to the other eye. It has been known that, while the second eye was suffering rupture of the cornea, the first eye, by cicatrizing, was only becoming liable to the same accident again, and this second rupture of the cornea has been preceded by as much pain as was the first.

Rupture of the cornea generally happens when the disease is at the height of its violence, and when the swelling of the external parts is so great, as to prevent an examination of those immediately

concerned in this event. From the distinct sensation, however, which the accident uniformly communicates to the patient, accompanied by a copious discharge of hot fluid, we seldom remain ignorant of the event having taken place. In other instances, the swelling of the conjunctiva and of the eyelids is not so great as to prevent the inspection of the eye at the time of its rupture. In these cases, the progress of disorganization may be observed. The surface of the cornea is seen to be first dull and hazy, then whitish, and at last, from matter infiltrated into its substance, it becomes yellow. Its lamellæ are, no doubt, by this infiltration detached from one another. The cornea swells, and advances gradually out of the pit formed around it by the chemosed conjunctiva. Its surface becomes ulcerated in one or more points. The ulcers rapidly deepen and spread, and at last the cornea gives way. Through the opening, or openings, thus formed, we may sometimes see the clear lens lying in its capsule. It rarely happens that there is any formation of pus, or deposition of coagulable lymph in the chambers of the eye in this disease; and hence, when the cornea is destroyed, the internal parts of the eye appear natural. The patient is sometimes able even to see objects pretty distinctly after the cornea has given way, and is apt to believe his eye to be nearly cured, or at least out of danger. The iris is pushed forwards into the opening or openings of the cornea, union takes place between the iris and the remains of the cornea, and a dense cicatrice forms over the protruded iris, and partial or total staphyloma is the result. In some cases, the iris remains protruding at different points, scarcely covered by any cicatrice or pseudo-cornea, but presenting a number of dark-coloured prominences, like the grains of a bramble-berry, a state of parts which is styled *staphyloma racemosum*.

In some cases at least, it would appear that the cornea is ruptured under one of those violent paroxysms of pain of which I have spoken, before it has undergone much disorganization. Dr Vetch minutely describes a case, in which, on examining the eye after the patient had felt the peculiar sensation indicating the rupture of the cornea, and the discharge of scalding fluid had taken place which attends this accident, he found merely a small line extending across the lower segment of the cornea, and which remained without any alteration after the eye was washed with tepid water. As any attempts to ascertain the nature of this line, gave uneasiness, its examination was left to next day. In the meantime, the patient saw better than he had done before the rupture took place. Next day, the line was more visible along its whole extent, from a slight opacity which accompanied it, and which daily increased, till the greater part of the cornea was not only opaque, but projected in an irregular cone, and as this alteration went on, vision, which for sometime after the rupture continued more correct than before, became totally obstructed.

It would thus appear that in certain cases, the aqueous humour escapes by a division of the cornea, nearly as clean as if made with

a knife. Were the disease to subside immediately after such a rupture of the cornea, this accident would in all likelihood be attended with little permanent injury to the sight. But, besides the obstacles which the presence of the disease offers to the healthy reunion of the cornea, the same causes which produced the first rupture continue to operate, so as to produce a second or a third, the disorganization and deformity increase, and the termination with respect to vision is proportionably unfavourable.

As Dr Vetch relates one case of this kind of rupture of the cornea with much minuteness, and tells us that he has seen several others of the same kind, I cannot think that he has been mistaken concerning the fact. Yet I am convinced that, far from being the manner in which the cornea generally gives way, this sort of rupture occurs but very rarely. One mode in which the cornea is destroyed is by ulceration, commencing on the surface and gradually penetrating into the cornea. An ulcerated trench is seen at some part of the edge of the cornea, where it is overlapped by the chemosed conjunctiva. This trench or groove gradually increases so as to embrace a fourth or a third of the circumference of the cornea, becomes deeper, and at length opens into the anterior chamber. Infiltration of matter into the substance of the cornea, presenting at first the appearance denominated *onyx*, and at length forming complete abscess of the cornea, followed by rupture and ulceration, is another, and, I believe, the most frequent mode of destruction. In some instances, but by no means frequently, the exterior lamellæ slough off in the form of loose leathery scales. Rarely, if ever, does the whole thickness of the cornea come away in this state.

In many cases, the progress of the disease is not terminated by the bursting of the cornea. In a few hours, the capsule gives way, the lens escapes through the ruptured capsule and cornea, more or less of the vitreous humour generally follows, and sometimes almost the whole contents of the eyeball are evacuated. In this case, no staphyloma takes place, but a small deformed eyeball is left deep sunk in the orbit, over which the lids fall in, become concave externally, and remain ever afterwards closed.

Although this ophthalmia proves most contagious in warm weather, the symptoms are greatly aggravated by the patient's exposure to cold and moisture. The symptoms are also more severe in females for some days previous to menstruation, and on this evacuation taking place they as constantly become mitigated.

The external symptoms of the disease, and the pain by which it is attended, cease at very uncertain periods. After the severe pain has entirely subsided, the vascularity and sarcomatous tumefaction of the conjunctiva generally remain stationary for a considerable time, and then rapidly diminish. In other cases, this process goes on slowly and gradually. The external tumefaction of the eyelids commonly disappears first, and then the chemosis gradually subsides, that part of the conjunctiva which immediately surrounds

the cornea first assuming its natural appearance, and presenting a ring of white similar to what was formerly seen in the advancement of the disease. The white space gradually enlarges till the swelling and vascularity are confined to the semilunar membrane and its neighbourhood, and to the bottom of the folds between the eyeball and eyelids. The eyelids have now a gaping and relaxed appearance from the subsidence of the tumefaction, and a little matter still forms on their internal surface. In this state, which may continue for months, any irritation of the eye or of the system is sufficient to cause a violent relapse, and the patient still continues capable of infecting others.

The rapidity with which the opacities of the cornea caused by this disease frequently disappear, when their removal once begins to take place, is a remarkable circumstance. In many cases of opacity of the cornea, which had been supposed to be perfectly hopeless, the patients have speedily recovered such a degree of vision as to be of considerable use to them. Dr Vetch mentions the following remarkable illustration of this fact :—

Case 206.—During the convalescence of a man from this disease, some pectoral symptoms, to which he had long been subject, suddenly assumed the appearance of pulmonary consumption, which proceeded rapidly towards its last stage. Five days before his death he was seized with a violent aggravation of the hectic fever and other symptoms, so that his death was hourly expected. At this time, to the surprise of his attendants, the opacities, by which the vision of both eyes had long been obstructed, disappeared with amazing rapidity, so that a short time before his death, his sight became nearly as distinct as ever. On examining his eyes after death, the remains of the opacity were found to extend to the internal surface of the cornea, which was at the opaque part slightly corrugated. There was also a very partial adhesion of the iris to the cornea in both eyes, which had not been discerned during life.

In many cases, and especially after repeated relapses, the symptoms which are the latest to disappear are the indurated and hypertrophied state of the papillary structure of the conjunctiva, and the vascularity and opacity of the cornea depending on the constant irritation produced by the friction of the diseased eyelids upon the eyeball. The state of the conjunctiva of which I am speaking has generally received the name of *granular conjunctiva*. If by granular those who employed this term meant merely that the conjunctiva was extremely irregular on its surface, the name would not be unexpressive nor very improper. It has evidently been used, however, to signify a state of granulation. We have even heard of removing the granulations of the conjunctiva. That the prominences in question are not granulations is proved both from the nature of the conjunctiva and from the history of this symptom itself. No mucous membrane is known to throw out granulations, without having been previously ulcerated upon its surface. But in this disease, no ulceration of those parts of the conjunctiva which are affected with the granular appearance has ever existed. If these prominences were really granulations, adhesion between the eyelids and the eyeball would be extremely frequent, whereas this is a very rare occurrence. The granular prominences in question are nothing more than t

papillæ which cover the surface of the palpebral conjunctiva, hypertrophied by inflammation.

A principal difference between catarrhal and contagious ophthalmia is, that the latter affects the papillary structure of the conjunctiva with more rapidity and intensity, and is thereby apt to become inveterate. A patient may remain for many months with the conjunctiva of the eyelids in the granular state, his corneæ probably vascular and nebulous, but without any puriform discharge, when, after a fit of intoxication, or some other irregularity, the inflammation shall suddenly return in its original form, and with its original propagative power. Hence it may happen that a soldier, discharged in the state described, returning home into the country, and there relapsing, may give rise to an ophthalmia which shall spread through many families, with all the symptoms and severity of the original disease.

Constitutional symptoms. The system does not appear to be in the smallest degree primarily affected; the early stage is entirely local. The pulse commonly continues soft. The skin is seldom hot. Thirst is seldom remarked. The appetite for food is rather keen than otherwise. The blood drawn is not, in general, buffy. All these circumstances denote how little the constitution is affected in the early stage of the disease. Varieties, no doubt, must occur in this respect. Judging from the accounts given by Dr Vetch and Sir Patrick Macgregor, we should conclude, that children labouring under this disease are subject to more constitutional irritation than adults. As the local symptoms grow in severity, the constitution begins to suffer. The pulse becomes frequent and sharp. At last, there is always much general uneasiness, and sleep is prevented by the paroxysms of nocturnal pain. The blood, now taken from a vein, is highly inflamed. Great debility comes on, especially when the patient has suffered repeated relapses. Sir James Macgregor states that in Egypt the disease very often continued two or three months, that it much impaired the general health, often terminated in diarrhœa or dysentery, and that sometimes the patient became hectic.[3]

Predisposing causes. The military life appears to be one of the strongest predisposing causes. This includes the hard exercise of soldiers, their exposure while on guard during the night, their exposure to changes of temperature, and especially to cold, dirty crowded barracks, bad diet, the excessive use of alcoholic drinks, improper clothing, and various other detrimental influences. Dr Vleminckx thinks the great predisposing cause is the inconvenient clothing of soldiers, especially their tight collars and heavy caps. Since these have been rectified in the Belgian army, the disease has become less and less.

Propagation of the disease—Contagion—Infection—Epidemic character. I have already explained my views regarding the propagative power assumed by the common catarrhal conjunctivitis of this country; and have hinted that probably the ophthalmia which arose

in the British and French armies in Egypt, and with which they returned to Europe had a similar origin. Assalini attributes the disease as it occurred among the French, to the vivid light and excessive heat of the country as predisposing causes, and suppressed perspiration as the occasional cause; or, in other words, considers it as a catarrhal ophthalmia. Catarrhal inflammation of the conjunctiva, arising where or how it may, appears speedily to acquire, if it does not from the first possess, the power of producing by contagion a disease similar in nature to itself, but much more severe.

It is undeniable that the return of the Egyptian expedition introduced a severe contagious ophthalmia into this country, which afterwards prevailed extensively in regiments which had never served in Egypt, and which accompanied the British troops to almost every foreign station to which they were sent. For many ages this ophthalmia has prevailed in Egypt. It is more frequent among the natives of the country than among strangers, owing to the freer intercourse of the former with each other; and for the same reason it is more common among the lower than the higher classes of society, and more in cities than in the country. But it is not confined in its origin to Egypt, nor to warm countries. It has been known to arise among a ship's crew, far from land. It is probably in a great measure the coldness of this climate, and our attention to cleanliness, which prevent the common catarrhal ophthalmia, which we see every day, from degenerating into the contagious disease.

Whether this disease be capable of propagating itself by infection, that is to say, whether the mere miasmata arising from the eyes of those affected with it, floating through the air, be capable of exciting the same disease in the eyes of others, is a point which still remains in doubt; for in every case in which this ophthalmia has spread through a regiment, school, or family, there has been a suspicion of actual contact, by means either of the fingers of the patients, or of the towels or other utensils which they were in the habit of using in common. Speaking of soldiers, Dr Vetch says, "Each company has a separate room, in which the intercourse among the men is necessarily great. Many things are used in common; nor are they even over scrupulous in washing their faces in the same water; and however attentively some may avoid this, they all are under the necessity of having recourse to the same towel." The same author observes, that "all the attendants on the sick, who were particularly careful in avoiding such intercourse as might communicate a local disease, escaped without exception."

The experiments of Dr Guillié, to which I have referred at page 374, fully demonstrate that puro-mucous conjunctivitis is, in the strict sense of the term, contagious, in other words, that the matter taken from an eye affected with this ophthalmia, and applied to the healthy conjunctiva of another eye, will produce the same disease.

Sir Patrick Macgregor has recorded several cases of accidental inoculation with the matter from the conjunctiva in this disease.

Case 207.—A nurse of the Military Asylum Hospital, about 9 o'clock, A.M.

when occupied in syringing the eyes of a patient, who had much swelling of both eyelids, with a profuse purulent discharge, found that some of the matter mixed with the injection had spurted into her left eye. She was directed to bathe her eye immediately with luke-warm water. She did so for several minutes; but, notwithstanding this precaution, about 7 o'clock in the evening, the left eye began to itch to such a degree, that she could not refrain from rubbing it. When she awoke next morning, the eye was considerably inflamed, the lids were swoln, and when she moved the eyeball, she had a sensation as if sand were lodged between it and the eyelids. In the course of the day, purulent matter issued from the eye, and other symptoms followed, which were similar to those in the children under her care. The disorder, however, subsided under the usual treatment in 14 days, the right eye remaining sound during the progress of the disease in the left.

Case 208.—Another nurse, about 8 o'clock, A.M. while washing with warm water the eyes of a boy suffering severely from purulent ophthalmia, inadvertently applied the sponge which she had used to her right eye. She immediately mentioned this circumstance to the other nurses, but took no means to prevent infection. Between 3 and 4 P.M. of the same day, great itching of the right eye took place, and before she went to bed, it was considerably inflamed. Next morning, her eyelids were swoln, she complained of pain on moving them, and the whole anterior surface of the eyeball was much inflamed. A purulent discharge also began to trickle down the cheeks from the inner canthus. The symptoms increased in severity, and, notwithstanding the means that were used for her relief, the eyeball burst in front of the pupil, on the 4th day after the application of the purulent matter. The sight of the eye was irrecoverably lost, and the inflammation continued for upwards of three months; but the left eye did not become affected.[4]

The following I regard as a striking, and indeed fearful instance of puro-mucous conjunctivitis, excited by atmospheric influence, spreading by contagion.

The French slave-ship, *Le Rôdeur*, Captain B. of 200 tons burden, left Hâvre on the 24th of January 1819, for the coast of Africa, reached her destination on the 14th of March, and cast anchor off Bonny. The crew, of 22 men, enjoyed good health the whole voyage, and during their stay at Bonny till the 6th of April. No trace of ophthalmia had been observed among the inhabitants of the coast, and it was not till 15 days after the *Rôdeur* had put to sea, and was nearly on the equator, that the first symptoms of disease were perceived.

It was observed that the negroes, who were 160 in number, and crowded together in the hold, and between decks, had contracted a considerable redness of the eyes, which spread with rapidity from one to another. At first, however, the crew paid no great attention to this appearance, imagining that it was occasioned merely by want of fresh air in the hold, and by the scarcity of water: for they had already limited the allowance of water to 8 ounces a-day, and some time after they could allow only half a glass a-day. It was thought sufficient to make use of an eye-water made from an infusion of elder flowers, and, following the advice of the person who acted as ship-surgeon, to bring up the negroes in turns upon deck. This salutary measure, however, they were obliged to abandon; for the poor Africans, torn from their native home, and heart-wrung by the horrors of their situation, as well as by the recollections of their lost freedom, embracing each other, threw themselves into the sea.

The disease which had spread among the negroes in a frightful

and rapid manner, now began to threaten even the crew. The first man of the crew attacked was a sailor who slept under deck, close to the grated partition which communicated with the hold. Next day, a lad was affected with the ophthalmia; and in the course of the next three days, the captain, and almost all the crew, were seized.

In the morning, on awakening, the patients experienced a slight pricking and itching in the edges of the eyelids, which became red and swoln. Next day, the swelling of the eyelids was increased, and attended with sharp pain; in order to lessen which, they applied to the eyes poultices of rice, as hot as they could bear them. On the 3d day of the disease, a discharge of yellowish matter took place, rather thin at first, but which afterwards became viscid and greenish; and was so abundant, that the patients had only to open their eyes every quarter of an hour, when the matter fell in drops. From the commencement of the disease, there were considerable intolerance of light, and discharge of tears. When the rice failed, boiled vermicelli was used for poultices. On the 5th day, blisters were applied to the nape of the neck of some of the patients; but as the cantharides were soon exhausted, they endeavoured to supply their place by the use of pediluvia containing mustard, and by exposing the swoln eyelids to the steam of hot water.

Far from diminishing under this treatment, the pain increased from day to day, as well as the number of those who lost their sight; so that the crew, besides fearing a revolt among the negroes, were struck with terror, lest they should not be able to manage the vessel till they should reach the West Indies. One sailor only had escaped the contagion, and upon him their whole hopes depended. The *Rôdeur* had already fallen in with a Spanish ship, the *Leon*, whose whole crew were so affected with the same disease, that they could no longer manage their ship, but begged the aid of the *Rôdeur*, already almost as helpless as themselves. The seamen of the *Rôdeur*, however, could not abandon their own ship, on account of the negroes; nor had they room to receive the crew of the *Leon*. The difficulty of nursing so many patients in so narrow a space, and the want of fresh provisions and of medicines, made the survivors envious of those who died; a fate which seemed to be fast coming upon all, and the thought of which caused general consternation.

Some of the sailors made use of brandy, which they dropped between their eyelids, and from which they experienced some relief; which might have suggested to the surgeon the propriety of a local stimulating treatment.

On the 12th day, the sailors who had experienced some relief came upon deck to relieve the others. Some were thrice attacked with the disease.

The tumefaction of the eyelids having subsided, some phlyctenulæ were observed on the conjunctiva of the eyeball. These the surgeon had the imprudence to open; a step which proved hurtful in his own case, for he remained blind, without any possibility of recovering his sight.

On reaching Guadaloupe, on the 21st June, the crew was in a deplorable state; but, very soon after, from the use of fresh provisions, and by simple lotions of spring water and lemon juice, recommended by a negress, they became sensibly better. Three days after coming ashore, the only man who, during the voyage, had escaped the contagion, was in his turn seized with the same symptoms; the ophthalmia running its course as it had done in the others on board ship.

Of the negroes, 39 remained totally blind, 12 lost each one eye, and 14 had specks, more or less considerable of the cornea.

Of the crew, 12 men lost their sight; one of these was the surgeon. Five lost each one eye, and amongst these was the captain. Four had considerable specks, and adhesions of the iris to the cornea.[5]

The history given by Sir Patrick Macgregor of the spread of puro-mucous ophthalmia in the Military Asylum at Chelsea, (an extensive institution for the education of soldiers' children,) in 1804, appears sufficiently demonstrative of its being propagated from person to person.

"In the beginning of the month of April 1804," says he, "two boys, brothers, were brought to the Infirmary with their eyes inflamed, but in so slight a degree, as not to require their being admitted. They were made out-patients, and by using the common remedies, got well in eight or ten days. In the end of this month, six boys with ophthalmia were brought to me; three of them had it in a violent degree, and were admitted into the Infirmary; the other three were ordered to attend daily for advice.

"In the month of May, no less than forty-four boys, and five girls, affected with ophthalmia, were brought to the Infirmary. The worst cases were admitted; but there was not room for all, and even some of those that were admitted, were necessarily mixed with other sick.

"On the morning of the fourth day after their admission, two boys who were in the same ward labouring under other complaints were attacked with inflammation of the eyes, and in the course of that week the nurse took the disease. She had it so violently, as to be deprived of sight for several days, and rendered unable to do the duty of her situation for about three weeks. About the same time, her son, a boy twelve years old, who had been in attendance on the sick, and a few days after, her two younger children, were attacked, as were several of the sick in the same ward.

"In June, fifty-eight boys and thirty-two girls were attacked. It was in general observed, that they had the disease in a more violent degree than those attacked in May. In the course of this month, the nurse of the Girl's Hospital caught it, and her husband, an in-pensioner of Chelsea Hospital, who came daily to see her, was also seized with it, as likewise were two occasional nurses. Upon inquiry, I found, that the above mentioned pensioner was the only person at this time affected with ophthalmia in Chelsea Hospital.

"The wife of a field-officer was at this time on a visit at the Military Asylum. She had a son between five and six years of age, who used to play with the other boys. He caught the ophthalmia, and on the fourth or fifth day after it appeared, his sister, a child two years old, was seized, and some days after this the lady herself took it.

"These circumstances gave alarm, and particular attention was paid to the immediate separation of those who had any symptoms of the disease from the other sick, and the other means usually adopted for checking the progress of contagion were had recourse to.

"In July, the ophthalmia continued to spread, and several of those children who had already had it, and were recovered, took it a second time. Sixty-five boys and thirty girls were attacked this month. They appeared to have the disease more severely, and did not so readily get well, as those affected in the preceding months, although treated in the same manner. The weather was much hotter than it had been the month before.

"In August, sixty-nine boys, and twenty-one girls, caught the disease; a boy and a girl, brought by their mother from Scotland, arrived at the Asylum one evening in the end of this month, and were immediately admitted. The children were put by the nurse, without my knowledge, into a ward occupied by patients affected with ophthalmia; on visiting the Infirmary next forenoon, I directed the children to be immediately removed into another ward. This was accordingly done; yet on the third morning after their arrival, both the children had symptoms of ophthalmia, which in no respect differed from what were observed in the others.

"All the boys from five to six and a half years of age are formed into one company. It was observed that in the course of the last, and present month, almost the whole of this company took the ophthalmia. Its progress could in their dormitories be traced from one bed to another, in the order in which they were placed, until nearly the whole were affected. The two nurses attached to this company always slept in their wards, and were the only nurses belonging to the institution (those connected with the Infirmary excepted) that suffered from the disease. About the middle of this month, I caught it myself; and though the inflammatory symptoms subsided in ten days, I did not recover from its effects in five or six weeks.

"In September, sixteen boys and four girls took the disease; in October, sixteen boys and seven girls; in November, nine boys and six girls; and from the twenty-second of this month to the end of December, only two instances of it occurred, and these were in two boys, brothers, who had slept together, and had laboured under the disease in the month of August in a violent degree.

"From the above statement of the progress of this ophthalmia, there is much reason to suppose that it was contagious. For if the disease had been first produced, and afterwards kept up, by any general cause, (as a peculiar state of the atmosphere) the girls

would have been as subject to it in the first instance, as the boys, and the officers, serjeants, and nurses of the institution, generally, would have been as liable to it, as the persons of the same description, that were immediately about the sick. But this was not the case; it had prevailed among the boys for near a month before the girls were attacked, and, as appears by the preceding statement, all the adults, who did not mix with the sick, escaped the disease, while those who were connected with them all suffered from it, the assistant-surgeon excepted.

"The disease sometimes showed itself as early as the third day after exposure to infection. This was clearly proved in the cases of the two children from Scotland.

"It would appear also, that closer connexion with the affected person was necessary to produce it, than what is requisite in most other contagious diseases. This may be inferred, from the servants of the Infirmary, and the two nurses that attended the little boys, taking it so readily, while the other servants of the institution escaped it.

"It was influenced by the state of the atmosphere, being much more severe in its attacks, and of longer duration, in hot sultry weather, than during cold or moderate weather. This was clearly seen in July, August, and September, when the disease was unusually severe, and of longer duration, than before or after those months.

"There is reason to think, that it was most contagious in its early stage, when the inflammation was active, and there was a considerable purulent discharge."[6]

While the generally received opinion, and one upon which it is wise to act, is, that this ophthalmia is contagious, some have inclined to the opposite way of thinking. Mr Lawrence, for instance, expresses[7] a doubt, whether the spread of this complaint, especially among soldiers, is owing to the application of a contagious matter, or to those unfavourable effects upon health which arise when many individuals are crowded together. Dr Eble, while he acknowledges the possibility of the disease being propagated *per contactum*, thinks that it spreads much oftener by infection *in distans*.[8]

This ophthalmia resembles other epidemic contagious diseases. The epidemic constitution, as it is termed, operates in its production, as in that of influenza, cholera, plague, dysentery, &c. all of which seem to become contagious. Like these diseases, this ophthalmia follows an irregular and inexplicable course, attacking one place and sparing the neighbouring places, manifesting remissions which we cannot account for, and as unaccountable exacerbations. At one time, the inflammation is so severe that all attempts to subdue it fail; at another, when the disease shows a tendency to yield, every effort proves successful in accelerating the cure. A series of causes, probably, and not one alone, operates in producing this ophthalmia, such as it formerly occurred in the British army, and has recently proven so destructive in the Belgian and other continental armies. An altered condition of the atmosphere in the

first instance, produces an epidemic catarrhal ophthalmia, which, afterwards, spreads from person to person in consequence of the transmission of a morbific principle through the air, while, in some cases, the disease is propagated by the immediate application of the purulent discharge from the conjunctiva.

Treatment. The treatment by which the cure of contagious ophthalmia is best promoted consists, on the one hand, of antiphlogistic means, and, on the other, of astringents. Let no man who feels anxious for the welfare of his patient neglect either the one or the other; but carefully employ both.

Constitutional treatment. 1. *Blood-letting.* When we have the charge of the patient from the beginning of the disease, and the symptoms are moderate, the treatment already recommended for catarrhal ophthalmia will generally be successful. Should we be later of being called in, and chemosis be already present, bleeding from the arm or temporal artery, to the extent of from 10 to 40 ounces, according to the age and constitution of the patient, followed by leeches round the eye, will be necessary, and may be repeated according to circumstances. The blood from the arm should be taken from a large orifice. The leeches, in number from six to twenty-four, should be applied within two hours after the bleeding from the arm. Leeches *en permanence* behind the ears are likely to do good.

We ought neither to delay the abstraction of blood, if the symptoms are acute, and the case of some days' standing; nor ought we, on the other hand, to indulge in the absurd expectation that profuse blood-letting is to check the disease completely, without the use of local applications. I hold any notions of this kind, which some may have entertained, as crude and irrational, and their practice as perhaps the most destructive which could be followed. By very profuse blood-letting, the patient is too much reduced, and the eye rendered more susceptible of disorganization. We must not for a moment indulge in the fancy that the stream of blood is to be allowed to flow, till the redness of the eye fades under our view, nor are we even to make the cessation of pain in the eye the condition for stopping the bleeding. These effects might not be obtained by abstracting 50 or 60 ounces of blood, whereas the same real benefit will follow in the course of an hour or two, if not more than 20 or 30 be taken, the patient will be less debilitated, and the course of the disease with greater certainty abridged.

Bleeding from the arm or temple may with propriety be repeated, if in the course of 24 or 36 hours, the symptoms have not abated, or have increased in severity. Afterwards, also, should there be any signs of a renewal of inflammatory action, more blood is to be taken away. It is chiefly in cases where there is pulsative pain in the eye, and circumorbital pain, coming on in nocturnal paroxysms, that repeated general blood-letting is necessary.

Besides venesection, and the application of leeches, scarification of the conjunctiva of the eyelids, and even of the eyeball, is to be

employed. This may be repeated every second or third day, or even every day. In the swoln and fleshy state of the conjunctiva which attends this disease, deep incisions, first on the inside of the lower eyelid, and then on that of the upper, may be made; they will bleed very copiously and greatly allay the symptoms. It is also a useful practice to snip away one or two of the folds of swoln conjunctiva, which project from between the eyelids. This causes a profuse discharge of blood. I am disposed to place scarification of the conjunctiva, and the snipping away of one or two of its folds, among the most effectual means of combating the disease.

2. *Regimen.* The patient is to remain at rest, in a well ventilated apartment, his eyes shaded from the light, and to adhere strictly to the antiphlogistic regimen.

3. *Purgatives.* In mild cases, blood-letting, at least general blood-letting, will not be necessary; but in all cases purgatives are to be used. A dose of calomel and jalap may be given at first, and either repeated from time to time during the course of the treatment, or changed for some of the neutral salts. Purgatives operate not merely by depleting, but have a strong sympathetic effect upon the conjunctiva. Emeto-purgatives, as tartar emetic with sulphate of magnesia will be found highly useful.

4. *Diaphoretics.* As soon as the active inflammation is subdued, much advantage will be derived from promoting the action of the skin. For this purpose the warm pediluvium is to be used at bed-time; after which the patient may take from 10 to 20 grains of Dover's powder. The action of these remedies may be assisted by draughts of tepid diluents, and during the day by small doses of antimony or acetate of ammonia.

5. *Alteratives.* Next to copious venesection, no remedy will be found more useful in severe cases, attended by nocturnal circumorbital pain, than calomel with opium. Two grains of the former, with from $\frac{1}{4}$th to a whole grain of the latter, may be given in the form of a pill every second hour, or thrice a-day, or only at bed-time, according to circumstances, till the mouth is sore. I use this from the first.

6. *Bark* and other *tonics* are to be given only in the chronic stage. They are then highly useful.

Local treatment. If no local remedies are employed, or only improper ones, the eyes may be lost, notwithstanding the best directed general treatment. It may to some appear paradoxical that the local applications in this disease ought to be alternately soothing and stimulating. Were we to trust to either sort alone, we should endanger the eyes. Soaking them constantly with tepid water, or laying emollient cataplasms over them, would be almost certain destruction; and, on the other hand, a perpetual succession of stimulating solutions and salves would not be less detrimental. The bad effects of a continued soothing or emollient local treatment, are well illustrated in the history already quoted of the French slave-ship at sea, while the good effects of stimulants are shown by the rapid im-

provement which followed the negress's prescription of lemon-juice, on the patients going on shore at Guadaloupe. Applications which smart the eye are also employed by the native Africans in their own country for the cure of this ophthalmia.[9] The Arrowawk Indians in South America, employ the expressed juice of the root of the bignonia ophthalmica, with great success.[10] Urine, sea-water, solution of common salt, solution of alum, and many similar substances, have been found useful for the same purpose.

1. *Cleaning the eyes.* The first point in the local treatment is to clean away completely and frequently, in the course of the day and night, the puriform discharge. This is to be done with a small syringe, the fluid employed being sent over the whole surface of the conjunctiva with considerable force, but especially into the fold between the eyeball and upper eyelid. The fluid which I recommend is a tepid solution of 1 grain of corrosive sublimate, with 6 grains of sal ammoniac, in 8 ounces of water, to which are added 2 drachms of vinum opii. This not only cleans the eye, but acts also as a gentle astringent.

2. *Astringents.* With regard to other astringents, my experience leads me decidedly to condemn sugar of lead, in whatever form: nor can I speak favourably of sulphate of zinc. Some highly recommend a strong solution of acetate of zinc, while others trust to solid sulphate of copper, rubbed over the internal surface of the eyelids.[11] I consider the solution of nitras argenti as the best remedy for constringing the inflamed vessels, allaying the painful feeling of sand in the eye, and lessening the discharge. I have tried this solution in various degrees of strength, and consider 10 grains to the ounce of simple distilled water, as recommended by Dr Ridgway,[12] to be the most suitable. The solution may be applied every five or six hours, or as soon as the raw painful feeling in the eye is renewed. It is to be taken up with a pretty large camel-hair pencil, with which first the inside of the upper eyelid is to be well brushed and then that of the lower, not omitting any of the folds formed by the chemosed conjunctiva. We generally find a very marked improvement in the course of 24 hours, under the use of this application. Should it disappoint our expectations, and the purulent discharge run on unabated, recourse may be had to a salve containing from 10 to 20 grains of the nitrate of silver in an ounce of axunge, or the inside of the lids may be touched rapidly with the lunar caustic pencil. Red precipitate salve, of the strength of 30 grains to the ounce of axunge, has been found useful, as an application to the conjunctiva, and may be substituted for the preparations of lunar caustic.

3. *To prevent the lids from adhering*, recourse is had to the red precipitate, or the citrine, ointment, melted on the end of the finger, and rubbed along the edges of the lids at bedtime. I generally anoint the edges of the lids each time I apply the solution of the nitras argenti. One or other of these applications fulfils not only the intention here stated, but operates in subduing the inflammation. Indeed, Sir Patrick Macgregor states[13] in his first paper, that of

all the remedies that were employed in the Military Asylum, the citrine ointment was found the most frequently successful.

4. *Counter-irritants* are highly serviceable in this disease, and ought always to be employed. There is generally a marked change in the quantity and appearance of the discharge from the eye, as soon as a counter-discharge is established by blisters on the temples, on the nape of the neck, or behind the ears.

5. *Opiate fomentations, and friction.* Considerable relief to the pain of the eye is sometimes obtained from allowing the steam of hot water with laudanum, to rise into the eyes from a teacup; or from fomenting the eyes with warm decoction of poppy-heads. Rubbing the head with warm laudanum when the circumorbital pain threatens to commence, is also highly useful.

6. *Dilatation of the pupil.* Although it is rarely the case that adhesions of the iris form in any of the puro-mucous ophthalmiæ, unless to the cornea in consequence of penetrating ulcers, still in case adhesions should occur, it may be proper to rub the brow with the extract of belladonna, so as to dilate the pupil.

7. *Evacuation of the aqueous humour* has been adopted as a means of relieving the severe pain of the eye and head, and of preventing bursting of the cornea. This is a practice of the utility of which in contagious ophthalmia I can say nothing, from my own experience; nor do I conceive it will often be required, if the remedies already recommended be had recourse to. Sir Patrick Macgregor expresses his conviction that many have lost their sight from rupture of the cornea, whose eyes might have been saved by a timely and judicious performance of this operation. Within two years he had performed it in twenty-three instances, with a degree of success which strongly induced him to recommend it.

8. *Solid caustic to ulcers of cornea.* In cases of ulcers of the cornea, much advantage is derived from the use of the lunar caustic pencil, sharpened to a point, and applied for an instant to the spot. The good effects of this application are often very striking, where a small portion of the iris protrudes through an ulcer.

9. *Vinum opii.* When the purulent discharge is gone, or nearly so, the vinum opii, pure or diluted, proves an excellent application to the relaxed conjunctiva. It is sometimes advantageously combined with a solution of the lapis divinus.

Granular conjunctiva and nebulous cornea, two important sequelæ of contagious ophthalmia, I shall consider in a separate section. Of the eversion of the lids, which occasionally proves a troublesome attendant on this ophthalmia, I have already treated at page 187.

Preventives. To military surgeons especially, the means of preventing this destructive disease are of high importance. Some of the following rules they will at all times be able to follow; the others must depend on the higher military authorities.

1. Supposing that troops were sent to any of the countries where this disease prevails, it would be necessary to guard them as much as possible against the exciting causes of catarrhal ophthalmia, in

which it appears that the contagion originates. It is found in Egypt that exposure to the night air is extremely apt to bring on the ophthalmia of the country. Soldiers on guard, then, or at bivouac, should, during the night cover their heads well; and if in moist and cold situations, avoid currents of air as much as possible. Dr Vetch mentions that of four officers who slept in the same tent, in Egypt, two took the precaution to bind their eyes up every night, when going to rest, and the two others did not; the latter were in a very short time attacked by the disease, while the other two escaped.

2. Heavy caps and tight stiff collars are to be laid aside.

3. As soon as there are any appearances of puro-mucous ophthalmia in a regiment, a daily and minute inspection by the medical officers of every individual belonging to it, becomes a duty of the first moment, both for the sake of those who may have caught the disease, and for the sake of their comrades.

4. Those in whom the disease is detected should instantly be separated from the rest, and must not join their companies, till they are perfectly cured, and have passed several weeks in an establishment removed some miles from the place where they were attacked.

5. Those patients who are found to be liable to frequent relapses, or who are affected with obstinate granular conjunctiva, should be invalided or sent to a distance.

6. Excessive crowding of the men together, especially in their dormitories, must be carefully avoided, as this of itself appears very much to promote the contagious power and spread of the disease, and to prevent its cure. A well ventilated hospital, in a wholesome open situation, is to be chosen. The beds are to be placed asunder. Proper means for disinfecting the air, clothing, utensils, &c. are to be adopted.

7. Those exposed to the disease ought to be made acquainted with the fact of its contagious nature, and warned against the modes in which it is likely to be communicated; as, touching the eyes of the diseased person and then touching inadvertently their own, using the same towel as those affected with the ophthalmia, and the like. Barrack-towels must afford a constant medium for the communication of this disease, and ought, therefore, to be discarded.

8. It will be found a salutary practice, frequently to parade the men in their respective companies, with separate vessels of water, while an officer attends to see their faces and eyes carefully washed.

9. A regiment, attacked by the ophthalmia, should move from the station where the disease seems to be epidemic.

10. If the number be great who have suffered from the ophthalmia, they should be formed into a battalion, into which no fresh recruits are to enter, and which should be removed to a wholesome locality, and not re-admitted into the service till after several months' separation.

[1] *Conjunctivitis puro-mucosa contagiosa. Egyptian ophthalmia. Ophthalmoblenorrhœa. Purulent ophthalmia. Ophthalmia purulenta gravior. Ophthalmia bellica.*

[2] Account of the Ophthalmia which has appeared in England since the return of the British Army from Egypt, p. 117 ; London, 1807.

[3] Medical Sketches of the Expedition to Egypt from India, p. 151 ; London, 1804.

[4] Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge ; Vol. iii. p. 52 ; London, 1812. Similar cases are recorded by Decondé, Bulletin Médical Belge, Avril 1837, p. 54.

[5] Bibliothèque Ophtalmologique, par M. Guillié; Tome i. p. 74 ; Paris, 1820.

[6] Op. Cit. p. 31.

[7] Lectures on Surgery, London Medical Gazette ; Vol. vi. p. 745 ; London, 1830.

[8] Eble, Ueber die in der Belgischen Armee herrschende Augenkrankheit ; p. 10. Wien, 1836.

[9] Winterbottom's Account of the Native Africans in the neighbourhood of Sierra Leone ; Vol. ii. p. 129 ; London, 1803.

[10] Duncan's Medical Commentaries ; Vol. xix. p. 368 ; Edinburgh, 1795.

[11] O'Halloran's Practical Remarks, p. 12 ; London, 1824.

[12] London Medical and Physical Journal ; Vol. liii. p. 122 ; London, 1825.

[13] Op. Cit. p. 42.

SECTION VII.—OPHTHALMIA OF NEW-BORN CHILDREN.

Infants are subject to a puro-mucous inflammation of the conjunctiva, commonly denominated *ophthalmia neonatorum*, or the *purulent ophthalmia of infants.* This affection generally occurs within a week after birth ; sometimes not for three or four weeks.

Causes. The cause is not uniform.

1. There is reason to suspect that this disease is, not unfrequently, an inoculation of the conjunctiva by leucorrhœal fluid, during parturition ; and that, therefore, it may often be prevented, by carefully washing the eyes of the infant with tepid water, as soon as it is removed from the mother. This is too seldom attended to ; the child is allowed to open its eyes, the nurse sitting down with it on a low seat before the fire, or in a draught of cold air from the door, and nothing is done to the child for perhaps half an hour or longer. It will, in general, be found, that when the child becomes affected with this ophthalmia, the mother had leucorrhœa before and at parturition, and that the eyes were not cleaned for some time after birth. Like a disease communicated by contagion, this ophthalmia is sudden in its attack, and much more violent than we almost ever see catarrhal ophthalmia, so that it resembles in this respect the Egyptian, or the gonorrhœal inflammation of the conjunctiva.

2. That the purulent ophthalmia of infants, in its worst form, is the result of the application of gonorrhœal matter, during the passage of the head through the vagina, is generally admitted.

3. Exposure to the light, to the heat of the fire, or to the cold draught from the door, are all likely enough to have an injurious in-

fluence on the eyes of the new-born infant; and, accordingly, some have been led to attribute the purulent ophthalmia which so frequently shows itself after birth, to these causes. That some of the cases are catarrhal, is by no means unlikely.

4. I have little doubt that this ophthalmia is frequently traumatic, being occasioned by the soap with which the child is washed, or the whisky which is absurdly rubbed over its head, intruding into its eyes.

Symptoms. It is commonly on the morning of the third day after birth, that the eyelids of the infant are observed to be glued together by concrete purulent matter. On opening them, a drop of thick white fluid is discharged, and on examining the inside of the lids, they are found extremely vascular and considerably swoln. First one eye is affected, and in a few days the other also. If neglected, as this disease but too often is, or treated with some such useless application as a little of the mother's milk, the lids swell externally and assume a dark red colour, the inflammation of the conjunctiva rapidly increases, and the purulent discharge becomes very copious. The infant keeps the eyes constantly shut. In this state the eyes may continue for eight days, or a few days longer, without any affection of the transparent parts, except perhaps slight haziness of the cornea. About the 12th day, however, the cornea is apt to become infiltrated with pus, its texture is thereby speedily destroyed, it gives way by ulceration, first of all exteriorly to the pus effused between its lamellæ, and then through its whole thickness, and this either in a small spot only, or over almost its whole extent; so that sometimes we find only a small penetrating ulcer, with the iris pressing through it; in other cases the whole cornea gone, the iris exposed, and the humours protruding through the pupil.

The lens often comes away. A poor woman from Paisley, who had trusted to the opinion of her midwife, that the disease was common and not at all dangerous, brought me her child, aged five weeks. She had with her, wrapped up in a bit of rag, the left lens, dry and shrivelled, it having that morning been discharged through the ulcerated cornea. I put it in water for a few hours, when it became plump and transparent. It was enclosed in its capsule. On submitting some shreds of the lens to the microscope, the fibrous texture was quite evident. The right cornea was opaque, and partly ulcerated.

It is melancholy to reflect on the frequency of destroyed vision from this disease, especially as the complaint is completely within control, if taken in time and properly treated. The attendants are not alarmed sufficiently early, by what they consider as merely a little matter running from the eye; and but too often it happens that medical practitioners are also betrayed into the false supposition, that there is nothing dangerous in the complaint, till the corneæ burst, and the eyes are for ever destroyed. Many children have been brought to me in this state; but the most deplorable instance of the disease which I have witnessed, was that of twin infants

from Perthshire, for whom I was consulted, sometime ago. One of the children had totally lost the sight of both eyes, while the other retained but very partial vision with one eye.

That this disease is a puro-mucous or blenorrhœal conjunctivitis is sufficiently evident. It is scarcely necessary to spend time in refuting Mr Saunders' notion of its being an erysipelatous inflammation. His opinion regarding the mode in which the cornea is destroyed in this disease appears of more importance, but equally incorrect. He maintains that it is by sloughing, not by suppuration and ulceration, that the destruction of the cornea is effected. The opportunities which I have had of watching the progress of the affection of the cornea have convinced me of the contrary. Onyx or infiltration of pus into the substance of the cornea is the uniform harbinger of destruction; the lamellæ exterior to the pus give way by ulceration; the ulcer spreads and deepens, till the cornea is penetrated, and often almost quite destroyed. Any thing like mortification, or sloughing, I have never seen. The coming away of the purulent infiltration, exposed by ulceration, must have given rise to Mr Saunders' notion of successive sloughs.

Infants labouring under this ophthalmia are fretful and uneasy, and rest ill during the night. The tongue is white, and the bowels deranged. If the disease is neglected, the flesh wastes away, and the integuments become loose and ill-coloured.

Prognosis. If the corneæ are only free from ulceration, and from purulent infiltration, how violent so ever the inflammation may be and profuse the discharge, our prognosis is favourable—the sight is safe. If the disease has been allowed fairly to establish itself, and its progress not interfered with for eight days or longer, it often proves tedious; six, eight, or ten weeks elapsing before it is perfectly cured. It is always more difficult to overcome, when the child is exposed to cold damp air, ill nourished, improperly fed, or when the nurse drinks spirits or porter. If there is superficial ulceration, without onyx, probably a slight speck may remain. If the ulceration is deep, an indelible opacity must be the consequence. If the iris is protruding through a small penetrating ulcer, the pupil will be permanently disfigured, and vision more or less impeded. If the ulcer is directly over the pupil, the probability is that the pupillary edge of the iris will adhere to the cicatrice, and vision be lost until an artificial pupil be formed in after-life by an operation. If there is a considerable onyx, we can promise nothing, for although, under proper treatment, the matter may be absorbed, this is by no means a certain result; the purulent exudation may, on the contrary, increase, the cornea burst, and the eye become partially or totally staphylomatous. Whenever the person who brings the child to me announces that the disease has continued for three weeks or longer, I open the lids of the infant with the fearful presentiment that vision is lost, and but too often I find one or both of the corneæ gone, and the iris and humours protruding. In this case, it is our painful duty to say that there is no hope of sight.

The most dangerous variety of ophthalmia neonatorum is that which arises from gonorrhœal inoculation. In this case, unless the disease is taken early and treated energetically, one or both eyes are likely to be lost. In gonorrhœal cases, there is much swelling of the lids and conjunctiva, the pain is severe, and the yellowish or greenish discharge very copious.

Like all the other violent puro-mucous inflammations of the conjunctiva, opththalmia neonatorum is much more destructive in cases where the eyelids are short, and press more than ordinarily on the eyes, than when the fissure between them is long, and their sinuses ample.

Central capsular cataract is by no means an uncommon result of ophthalmia neonatorum, the capsule partaking perhaps in the inflammatory action, and becoming partially albuginous. The opacity is often no bigger than a pin-point; in other cases it is more extensive, but is seldom, if ever, larger than the pupil, and never, as far as I have seen, occupies any other situation than the centre of the anterior hemisphere of the capsule. I have not observed this opacity to be in any case totally removed, and have scarcely seen it diminish in any degree. As the child grows, vision improves, in consequence of the expansion which the pupil undergoes; the cataract remaining of its original size. Short-sightedness seems to be one of the results of the central capsular opacity.

Oscillation, strabismus, and incomplete amaurosis, are occasional sequelæ of ophthalmia neonatorum.

The purulent discharge in ophthalmia neonatorum is highly contagious; a melancholy example of which I witnessed at the Glasgow Eye Infirmary, in an infant and its grandfather; the latter inoculated from the former. Both were so severely affected, that the infant had the one eye left in a state of total, and the other of partial staphyloma; while in each eye of the old man, the greater part of the cornea remained opaque and adherent to the iris.[1]

Treatment. 1. As it is of the utmost importance to remove the purulent discharge, from time to time, in the course of the day, I may be excused for explaining minutely how the eyes are to be cleaned. Unless the discharge is removed with regularity and care, other means will fail in curing the disease. The surgeon lays a towel over his knees, on which to receive the head of the child, which the nurse, sitting before him, lays across her lap. Every person bringing a child with ophthalmia neonatorum to an Eye Infirmary, should be supplied with a separate bit of sponge for cleaning the eyes, else by using the same sponge for different children, we may re-infect the eyes when they are beginning to get better. The fluid for washing the eyes is the tepid solution of 1 grain of corrosive sublimate, with 6 of sal ammoniac, in 8 ounces of water. The lids are opened gently, and, with the bit of sponge, the purulent discharge, which gushes out, is removed. The lower lid, and then the upper, are next everted, and wiped clean with the sponge. The upper lid has a tendency to remain everted, especially if the

child cries. This is overcome by pushing the swoln conjunctiva into its place, and bringing down the edge of the lid. All this ought to be repeated three or four times, or oftener, in the 24 hours, by the nurse, or by the surgeon. Washing out the discharge with a syringe is still more effectual, but the surgeon only should attempt this.

2. The corrosive sublimate collyrium, used in cleaning the eyes, tends gently to repress the discharge. Alone, however, it is not sufficient for that purpose, and we have recourse, therefore, to astringent applications of more power. The solution of nitras argenti is what I have found most useful. With a large camel-hair pencil, the solution of 10 grains in an ounce of distilled water is to be applied to the whole surface of the inflamed conjunctiva, immediately after having cleaned it as above described. This application ought to be repeated, every six or eight hours. Not only the local, but even the constitutional good effects of removing and restraining the purulent discharge are very remarkable. The first night after the use of the collyrium and drops, we generally find that the infant has been much quieter than it had been when the disease was neglected. In two or three days, the infant begins to open the eyes; and in 10 or 12 days the acute symptoms are overcome.

3. To prevent the eyelids from adhering, the red precipitate ointment, melted on the end of the finger, is to be applied along their edges, whenever the child goes to sleep.

4. The above remedies are perfectly sufficient to remove this disease, if had recourse to within two or three days after the first symptoms have shown themselves. I have seen two applications of the nitras argenti solution, viz. on the 3d and 4th days after birth, or 1st and 2d days of the disease's showing itself, remove the complaint completely, although thick white matter had been secreted by the conjunctiva. In cases attended by a discharge less distinctly puriform, the use of the red precipitate salve at bedtime has sometimes been sufficient. In cases, again, which have been neglected for perhaps eight or ten days, it is necessary to take away blood from the external surface of the upper eyelid by the application of a leech, or from the inflamed conjunctiva by scarification. The former may be tried in the first instance, and unless followed by marked abatement of the redness and swelling on the inside of the lids, the conjunctiva may next day be divided with a lancet. The taking away of blood in either of these ways is productive of much benefit, and ought by no means to be omitted, if there be any tendency to chemosis or any threatening of haziness of the cornea. A more profuse loss of blood than can be obtained by the methods here recommended, I do not consider necessary. It may be proper, however, to leech or to scarify repeatedly.

5. Should the conjunctiva threaten to assume the sarcomatous or granular state, scarification should be used, after which a salve containing 10 grains of nitrate of silver in 1 ounce of axunge should be applied to the inside of the lids, or these being wiped dry, are to be rapidly touched with the lunar caustic pencil. The latter applica-

tion generally produces considerable pain and swelling of the lids, which subside under the use of cold wet compresses. Strong red precipitate salve is also a valuable application in granular conjunctiva.

6. A remedy of great service in this disease is the application of blisters behind the ears, or to the back of the head. Cantharides plaister spread on a bit of candle-wick, and laid between the head and the external ear, is a convenient mode of breaking the skin; and by continuing this application either constantly, or several hours daily, a continued discharge will be procured. As soon as there is a discharge of matter from the blistered parts, we perceive an amendment in the affection of the eyes. If, however, the ears are allowed to get well, we often observe a renewal of the inflammation of the conjunctiva, and a more copious flow of puriform matter, but the symptoms again subside if the blisters are re-applied.

7. A dose of castor oil occasionally will be found useful.

8. Small doses of calomel are highly beneficial. From a quarter to half a grain daily will be sufficient. Besides acting favourably on the conjunctiva, this remedy is likely to counteract the tendency to capsular cataract.

9. In threatened disorganization of the cornea, Mr Saunders has strongly recommended the extract of cinchona. The sulphate of quina answers better, and is more easily administered. Half a grain may be given twice or thrice daily.

10. The relaxed conjunctiva, after the purulent discharge has entirely subsided, may be advantageously touched once a-day with vinum opii. I have sometimes treated cases with the vinum opii throughout, but I consider this remedy as more applicable for the chronic stage of the complaint than for the acute. It serves to clear the cornea from the opacities, so apt to be produced by this disease.

11. The mother or nurse's diet should be carefully regulated. During the acute stage of the ophthalmia, she should take no animal food, and should taste neither wine, spirits, nor ale. After the acute stage is over, should the conjunctiva continue relaxed, tincture of iron may be given to the nurse with advantage to the child

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[1] A similar case is related by Jüngken, in his work Ueber die Augenkrankheit welche in der Belgischen Armee herrscht; p. 8; Berlin, 1834.

SECTION VIII.—GONORRHŒAL OPHTHALMIA.

Different views have been entertained of the purulent inflammation of the conjunctiva, which is frequently found to attend, or succeed to gonorrhœa. 1st, This ophthalmia has been ascribed to inoculation with matter from the urethra; 2dly, It has been supposed to be metastatic; and 3dly, It has been considered, at least in certain cases, as an effect owing to irritation merely, without

either inoculation or metastasis. It is quite possible that there may be three such varieties of this ophthalmia. The existence of the first I consider beyond all doubt; but the second and third are somewhat problematical.

Some, while they have admitted that facts fully demonstrate that gonorrhœal ophthalmia occasionally owes it origin to inoculation, have expressed their surprise that it is not more frequently produced in this way, considering how common gonorrhœa is, and how careless many of those of the lower ranks are of cleanliness. We should expect, say they, the finger to be in many more cases the conveyer of the matter of the gonorrhœa to the conjunctiva, than it actually appears to be. The instinctive closure of the eyelids when the finger approaches the eye, making it actually difficult for a person to touch his own conjunctiva, unless with one finger he draws down the lower lid, and intentionally applies another finger to the eye, will serve in some measure to explain the rarity of this kind of inoculation.

Women are much less frequently the subjects of gonorrhœal ophthalmia than men.

In general, it is only one eye which is affected with this disease. Whenever we see one eye affected with severe puro-mucous inflammation, the lids much swoln, and of a livid colour, and the discharge copious, without any affection of the other eye, we may suspect the case to be gonorrhœal. Dr Vetch, speaking of the Egyptian ophthalmia says, "there is not one case in a thousand in which one eye only becomes affected."[1]

§ 1. *Gonorrhœal Ophthalmia from Inoculation.*

Case 209.—A patient was brought to me sometime ago from the country by a gentleman under whose care he was, and who had formerly been one of my pupils. The left eye was violently inflamed and chemosed, the chemosis of a pale red colour, the conjunctiva discharging a large quantity of purulent fluid, the lower lid greatly everted, and the cornea, from lymph, and probably pus, effused between its lamellæ, totally opaque. The patient was affected with gonorrhœa, and 13 days before I saw him, while engaged in removing the discharge from the urethra, a drop of the gonorrhœal matter was by mischance thrown fairly in upon his left eye, and excited the severe puro-mucous ophthalmia under which he was labouring. The gonorrhœa still continued when I saw him. The inflammation of the eye subsided under appropriate means, the cornea cleared to a degree far beyond my expectations, and a considerable share of vision was preserved. The right eye was not at all affected.

Case 210.—Mr Allan relates the following interesting case of contagious gonorrhœal ophthalmia. "I was consulted," says he, "by a young gentleman of 17 years of age, on account of a gonorrhœa recently contracted, but by no means severe. In a few days after his application to me, the eyes became violently and suddenly inflamed, the eyelids much tumefied, and there took place a profuse discharge, similar to that of gonorrhœa, excoriating the cheeks, and accompanied by great pain, considerable fever, and general restlessness; the discharge from the urethra did not at once disappear, notwithstanding the violence of the ophthalmia. In a few days, his younger brother, a boy of 14 years of age, who never had been exposed to any venereal complaint contracted by sexual intercourse, and who slept in the same room, was similarly affected; and the disease in both eyes was equally severe as in those of the elder brother. I called Dr Monro and Mr J. Bell into attendance; but notwithstanding every means that could be devised, the

elder brother lost the sight of both his eyes, and the younger brother of one eye. If it be said," adds Mr Allan, "that in the elder brother the ophthalmia might arise from a consentaneous connexion or sympathy betwixt the uretha and the conjunctiva, and not from the direct application of the virus, still this explanation will not at all apply to the younger brother, who had no gonorrhœa, but who must have contracted the disease from actual contact; as by using the same towel or wash-hand basin with his brother, wiping his face with the same handkerchief, or in some less obvious manner, and in whom it was equally severe."[2]

Case 211.—Astruc relates, that a young man had been in the habit of bathing his eyes every morning with his urine while it was yet warm, in order to strengthen his sight. Although he had contracted a gonorrhœa, he did not abstain from this custom, apprehending no harm from it; but the urine partaking of the infectious matter, quickly communicated the same disease to the tunica conjunctiva of the eye and eyelids. The consequence was a severe ophthalmia, attended with an acrid and involuntary discharge of tears and purulent matter, but which yielded to the same remedies which removed the gonorrhœa.[3]

Case 212.—A healthy young woman happened to wash her eyes with some sugar of lead water and a sponge which had previously been used by a young man affected with gonorrhœa; the consequence was, that she immediately contracted a severe ophthalmia, which rapidly destroyed one eye, and brought on swelling of the lymphatic glands about the neck, for which she underwent a course of mercury.[4]

So similar is the discharge from the eye in gonorrhœal and in Egyptian ophthalmia, to that which runs from the urethra in gonorrhœa, that some have gone the length of concluding that gonorrhœa has been originally an inoculation of the urethra by the matter derived from the eye in Egyptian ophthalmia; while others are of opinion that this last disease is nothing else than the effects of an inoculation of the conjunctiva with matter from the urethra in gonorrhœa. Both parties have referred to experiments in favour of their own opinion. Little can be drawn from negative experiments on this subject. It is demonstrated beyond all doubt that the matter from the urethra in gonorrhœa, applied to the conjunctiva, excites a severe puro-mucous ophthalmia, and a similar inflammation of the urethra has unquestionably been brought on by inoculation with the matter coming from the conjunctiva in the Egyptian ophthalmia; but experiments of this kind have also sometimes failed, and from such failures conclusions have been drawn that are altogether unwarrantable. For example, Dr Vetch tells us, that in a soldier in a very advanced stage of the Egyptian ophthalmia, he attempted to divert the disease from the eyes to the urethra, by applying some of the matter taken from the eyes to the orifice of the urethra. No effect followed this trial. It was repeated in some other patients all labouring under the most virulent state of the Egyptian disease; and in all, the application was perfectly innocuous. But, in another case, where the matter was taken from the eye of one man, labouring under purulent ophthalmia, and applied to the urethra of another, the purulent inflammation commenced in 36 hours afterwards, and became a very severe attack of gonorrhœa. From the result of these experiments, Dr Vetch, while he admits that gonorrhœal matter taken from one person and applied to the conjunctiva of another, will excite a highly purulent ophthalmia, regards himself justified in no longer admitting the possibility of infection being conveyed to

the eyes from the gonorrhœal discharge of the same person. He adds that the impossibility of this effect, was rendered decisive by an hospital-assistant, who, with more faith than prudence, conveyed the matter of a gonorrhœa to his eyes without any affection of the conjunctiva being the consequence.[5] It is remarkable, that Dr Guillié has fallen into the same error of reasoning as Dr Vetch, only that his negative experiments have led him to the very opposite conclusion. He applied the matter taken from the conjunctiva of one patient to the urethra of another; no effect followed, and hence he concludes that the notion of some, regarding the propagation of puro-mucous inflammation from one mucous membrane to another in different individuals, is unfounded.[6]

Case 209 would have been sufficiently convincing to me of the reality of gonorrhœal ophthalmia by inoculation, had I entertained any doubt on the subject. The patient had a profuse gonorrhœa, but his eyes were perfectly well; shaking away the discharge from the penis, and stooping at the time, a drop went fairly in on the left eye, violent inflammation immediately set in, was all along confined to the eye which had been inoculated, and produced the results already stated, while the gonorrhœa continued to run its course.

Diagnosis. There are no marks which can be absolutely depended on, by which to distinguish gonorrhœal ophthalmia, produced by inoculation, from the Egyptian or contagious ophthalmia. The symptoms of the former are not less rapid and severe than those of the latter; and the danger of losing the eye, by destruction of the cornea, greater perhaps than in any other ophthalmia. There is a great degree of chemosis, and a profuse discharge of matter, varying in colour like the discharge in gonorrhœa. The external surface of the lids is perhaps not so much swoln, nor of so dark a red colour, as in the Egyptian ophthalmia. In the early stage, it will also be observed, that in the latter disease the inflammation commences on the inside of the lids; whereas in gonorrhœal ophthalmia, it attacks the conjunctiva more generally. The history of the two diseases will perhaps afford the best ground for diagnosis.

Prognosis. In 48 hours, this disease may have proceeded so far, that sight shall be irretrievably gone. Out of 14 cases related by Mr Lawrence,[7] loss of vision took place in nine, from sloughing, suppuration, and opacity of the cornea. In two of these, the one eye was lost and the other recovered. Sight was preserved in the other five, with partial opacity of the cornea, and in three of the number with anterior adhesions of the iris.

Symptoms. The symptoms of gonorrhœal ophthalmia by inoculation bear so close a resemblance to those of the Egyptian ophthalmia that it is unnecessary to detail them.

The cornea is often destroyed by an ulcerated groove forming at its edge, where it is covered and pressed upon by the chemosed conjunctiva. This groove gives way, and the iris protrudes in one or several points. After this happens, the cornea appears small and

flat, its centre continues pretty clear for a while, but vision is lost. In other cases, I have seen ulceration spread over a great part of the surface of the cornea, without penetrating, at least for a time, through its whole thickness. It becomes so thin as to bulge forwards. At last it gives way, and the case ends in staphyloma.

Treatment. This ought to be exactly the same as in the Egyptian ophthalmia. Abstinence from all stimulants; blood-letting, both general and local; and the exhibition of purgatives, or emeto-purgatives, and diaphoretics, are to be had recourse to in the early stage. The discharge is to be frequently and carefully removed with the muriate of mercury collyrium, the conjunctiva is to be brushed repeatedly in the course of the day with the nitras argenti solution, and the lids are to be prevented from adhering by the use of the red precipitate salve. Counter-irritation ought to be employed from the very first, by means of sinapisms and blisters to the neck, between the shoulders, or behind the ears. If the pain of the eye be pulsative, or the circumorbital region affected with nocturnal paroxysms of pain, calomel and opium are to be given, till the mouth is sore. Warm fomentations, the vapour of laudanum, opiate friction of the head, and the like, will serve to moderate the pain; but our chief reliance must be placed on depletion, counter-irritation, scarification, and smarting applications to the conjunctiva. Snipping out a fold of the chemosed membrane, so as to procure a considerable flow of blood, is highly serviceable.

Bleeding alone must not be depended on. "The inflammation produced," says Mr Bacot, "in the few instances that have come under my observation, is of the most violent and intractable description, and has produced the total destruction of the organ of vision in the space of two or three days, notwithstanding the most vigorous employment of general and topical blood-letting, and other antiphlogistic means."[8] Neither are stimulants to be trusted to alone; but a combination of antiphlogistic and astringents is at once to be employed.

The acetate of lead, and the sulphates of zinc and copper, at least in the early stage, will be found to aggravate the symptoms. These are the local remedies recommended by Mr Allan; and the case already quoted, the publication of which does great credit to his candour, shows how little adapted these applications are to this disease.

§ 2. *Gonorrhœal Ophthalmia from Metastasis.*

Saint-Yves appears to have been the first to speak of gonorrhœal ophthalmia from metastasis. His account of it is very short. He describes the conjunctiva as becoming hard and fleshy, the disease having commenced by an abundant discharge of white or yellowish matter. He states that, in most cases, the ophthalmia began two days after the commencement of the gonorrhœa, the latter discharge having at that period suddenly ceased, and thus caused a metastasis to the eye. He recommends blood-letting from the first, mercury,

purgatives, and the warm bath. As local applications, he advises brandy and water, and a decoction of rosemary, sage, hyssop, and roses in red wine.[9]

Succeeding writers have adopted Saint-Yves' views of the subject with too little hesitation, and appear not to have sufficiently investigated the probability of the ophthalmia arising rather from inoculation than from metastasis.

The causes of the suppression of the gonorrhœa, to which the rise of metastatic gonorrhœal ophthalmia is attributed, are exposure to cold, violent exertions of the body, the abuse of spirituous liquors, and the employment of astringent injections into the urethra.

The following may serve as a specimen of alleged metastatic gonorrhœal ophthalmia.

Case 213.—A captain in the army, aged 29, was ordered to mount guard at court, in the month of January, when he had a violent gonorrhœa. The day was excessively cold, and he was forced by his duty to remain a long time exposed to the air during the day and night. Towards midnight he began to feel the most violent pain in both eyes at once, which very soon increased to such a degree that he could not endure any kind of light. Next day, these symptoms were attended by a discharge of puriform matter from both eyes, and the albuginea appeared very much inflamed and swoln. A physician was sent for, unfortunately very ignorant, who ordered general remedies, as bleeding, purgatives, &c. with a fomentation of hemlock. The third day, on examining things more closely, the cornea was found completely opaque, and a hypopion formed; there appeared to be no ulceration. The hemlock was continued without any effect. Ten or twelve days after, the inflammation began to abate, and the discharge from the eyes stopped; but the cornea did not recover its transparency; on the contrary, it was extremely thickened, and the patient remained entirely blind for life.[10]

Treatment. The only point of treatment in cases of metastatic gonorrhœal ophthalmia, different from that which is to be followed when the disease is brought on by inoculation, is the attempt, so much recommended by some authors, to restore the suppressed discharge from the urethra. This is to be done by introducing a bougie into the urethra, covered with some of the purulent discharge from the eye, or with gonorrhœal matter from another subject. Even the simple introduction of a bougie may perhaps produce the effect which is desired; for any stimulus applied to the lining membrane of the urethra, provided it be of sufficient activity to determine an irritation and an abundant secretion of mucus, may produce a running similar to gonorrhœa. If this plan is adopted, the bougie must be retained in the urethra for several hours at a time, till the desired effect is produced.

§ 3. *Gonorrhœal Ophthalmia without Inoculation or Metastasis.*

Various authors have related cases of puro-mucous ophthalmia occurring in individuals, who, either at the time when the ophthalmia attacked them, or a short time before its attack, had been affected with gonorrhœa. An alternation also has been observed by these authors between the two diseases; that is to say, when the gonorrhœa came, the ophthalmia went, and *vice versa*. The conclusion drawn from such cases has been, that a relation exists between the

two diseases, and that they are convertible the one into the other without being metastatic. None of the authors who have described the cases to which I now refer, have explicitly attributed the production of the ophthalmia in question to the influence of nervous sympathy; and yet, if we throw inoculation and metastasis aside, there appears to be no other means by which the diseases of remote organs can be connected, except by nervous communication. The facts recorded upon the subject are valuable, whatever opinion we may form of the reasonings of those by whom they are narrated.

Case 214.—Swediaur states that a young man in London came to consult him for an ophthalmia. After he had tried the best remedies, internal and external, that he knew of for an ophthalmia, without effect, the patient left him. He heard nothing more of him for two months, when he returned to him with gonorrhœa. During his absence he consulted several practitioners on account of his ophthalmia, but with no better success than before; but having caught a gonorrhœa eight days before returning to Swediaur, he began to feel his eyes better from the third day of the discharge. The ophthalmia continued to diminish from day to day, and he was now quite cured of it. Swediaur asked him if he ever had gonorrhœa previously to the attack of ophthalmia. He said he had it some time before he came to consult him first about his eyes; that he suffered much, and for a long time, with it, but that at last the discharge disappeared; and that he had not mentioned it, as he had not supposed there was any connexion between the gonorrhœa and the complaint in his eyes, which had come on several weeks after.

Swediaur tells us, that this fact was too striking a lesson for him ever to forget it; and that he never afterwards failed, in similar cases of ophthalmia, to ask the patient if he had not previously had a gonorrhœa, and if it was properly treated and cured. He describes the ophthalmia in cases of this sort, as a chronic inflammation of the eyes, and especially of the eyelids, attended very often with little ulcers of the sebaceous glands, and with an oozing of thick yellowish matter. In all such cases, especially when the patients told him that they had tried many internal and external remedies for the ophthalmia, he did not hesitate to advise the use of bougies for a couple of hours a-day, as the surest and speediest way of curing the ophthalmia; and he tells us, that he had the satisfaction of seeing most of such cases cured even without any other external application.[11]

Case 215.—A sailor used all his influence to get appointed to the command of a frigate. He waited on the Admiralty frequently, and was promised a ship; and in the meantime he went into Scotland grouse-shooting. Whilst there, he received instructions from the Admiralty to take the command of a frigate then lying at Falmouth; he lost no time in setting out, but placed himself in the mail-coach for London. Just before he left Edinburgh, he caught a gonorrhœa. On the journey, his eyes became inflamed; and when he reached London, he had a violent ophthalmia, with purulent discharge. He was in a dreadful state both of body and mind, could not bear the light and had great pain in the eyes.

Mr Abernethy, whom he consulted, asked him if ever he had gonorrhœa or inflamed eyes before. He answered, that he had had both the one and the other; and that when the discharge from his urethra was stopped, the eyes became bad, and when his eyes got well the gonorrhœa returned.

Mr A. directed him to remain quiet in a darkened room, to wash his eyes frequently in the course of the day, with tepid poppy water, to take five grains of the blue pill every night, with some castor oil to open the bowels, and to keep himself upon a strictly spare diet. During the first six days, he mended very

slowly and not considerably. But on the 7th day, when Mr A. called, he found the patient sitting up in his room, the window uncovered, and his eyes almost well. Mr A. expressed his surprise, and asked how this change had so suddenly happened, to which he answered, that he had a number of very copious fœtid stools in the night, and that his complaints had left him. It seemed to be a sort of critical secretion from the liver and the whole of the alimentary canal, followed by an almost immediate removal of the irritable inflammation of the eyes.

Mr Abernethy, in his surgical lectures, spoke of such cases as the above as examples of an *irritable ophthalmia*, attendant on gonorrhœa, very different from the purulent ophthalmia excited by touching the eye with the matter from the urethra, and in fact a constitutional malady. He stated that he had seen many cases of both diseases; that he had known many people who were liable to rheumatism of the joints, to puriform discharges from the urethra, and to this irritable ophthalmia; and that these diseases used to alternate the one with the other. When the rheumatism ceased, the discharge returned from the urethra, and when the discharge from the urethra ceased, the affection of the eye returned, and thus one disease supervened upon another. He stated that if the surgeon is frightened at this irritable ophthalmia, supposing it to be one of the dreadful cases in which the eye is clapped, and proceeds to bleed and purge the patient severely, he will only make the matter worse. Moderate bleeding, he said, may be useful, but the chief object is to attend to the patient's general health. No means are so likely to be useful as setting the digestive organs to rights, and sending the patient to the country.[12]

The two cases above quoted, with the remarks subjoined to them by their narrators, will serve in some measure to show the diversity which exists in the opinions entertained regarding the ophthalmiæ which in some individuals are found to attend gonorrhœa, or to alternate with this disease. It is quite evident that the ophthalmiæ which have been observed to do so are far from being uniform. That observed by Swediaur appears to have been little more than ophthalmia tarsi; that which occurred in Mr Abernethy's case bears a strong resemblance to catarrhal ophthalmia, and probably was nothing more. As it is acknowledged that in neither of these cases was there either inoculation or metastasis, it may fairly be doubted whether there was any connexion between the disease of the urethra and that of the eye farther than that they occurred in the same individuals, while the occurrence of both might be attributed to a susceptibility for disease arising from peculiar or debilitated constitutions.

Swediaur's hint to employ the bougie, in cases of ophthalmia alternating with gonorrhœa, may probably be found of use; it is evident, however, that this remedy cannot be trusted to alone, but that the ophthalmia must be treated according to the particular symptoms it presents, not according to the conjectural notions entertained regarding its origin.

In a subsequent section, I shall give some account of an internal

ophthalmia, which depends upon gonorrhœa, under the head of *Gonorrhœal Iritis.*

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[1] Practical Treatise on the Diseases of the Eye, p. 195 ; London, 1820.
[2] System of Pathological and Operative Surgery ; Vol. i. p. 153 ; Edinburgh, 1819.
[3] De Morbis Venereis, p. 192 ; Lutetiæ Parisiorum, 1736.
[4] Chirurgie Clinique de Montpellier, par le Professeur Delpech ; Tome i. p. 318 ; Montpellier, 1823.
[5] Op. Cit. p. 242.
[6] Bibliothèque Ophtalmologique ; Tome i. p. 83 ; Paris, 1820.
[7] Treatise on the Venereal Diseases of the Eye, p. 25 ; London, 1830.
[8] Observations on Syphilis, p. 46 ; London, 1821.
[9] Nouveau Traité des Maladies des Yeux, pp. 187, 209 ; Paris, 1722.
[10] Swediaur's Treatise upon the Symptoms, Consequences, Nature, and Treatment of Venereal or Syphilitic Diseases ; Translated from the French; Vol. i. p. 245 ; London, 1819.
[11] Ibid. p. 247.
[12] Lectures, in the Lancet ; Vol. vii. p. 5 ; London, 1825.

SECTION IX.—PHLYCTENULAR OPHTHALMIA.[1]

Having considered the blenorrhœal affections of the conjunctiva, we have now to turn our attention to its cutaneous or eruptive diseases. The chief of these are phlyctenular and pustular ophthalmiæ; to which may be added, the inflammation of the conjunctiva in small-pox, measles, scarlatina, and erysipelas. The conjunctiva is apt to suffer in all cutaneous eruptions. I have seen it evidently affected in herpes, lepra, and elephantiasis.

Phlyctenular ophthalmia, commonly known by the name of *scrofulous ophthalmia*, is distinguished from all the other inflammations of the eye by symptoms so very striking, that any one who has seen the disease once or twice, cannot mistake it. Slight redness, great intolerance of light, phlyctenulæ at the edge or on the surface of the cornea, and specks resulting from these phlyctenulæ, are the symptoms which characterize this ophthalmia ; a disease to which children are so liable, that out of the 100 cases of inflammation of the eyes in young subjects, 90 are of this kind. This ophthalmia is very often the first manifestation of a scrofulous constitution ; and, neglected or mistreated, frequently becomes the cause of permanently impaired vision, or even of entire loss of sight. It seldom attacks infants at the breast; from the time of weaning till about eight years of age is the period of life during which it is most prevalent. It is rare indeed for adults to be affected, unless they have suffered from the disease at an early period of life. Sometimes only one eye is inflamed; at other times both are affected from the first. Not unfrequently, the disease passes from the one eye to the other. When both are inflamed at once, the one is generally much worse than the other.

Symptoms. 1. *Redness.* At the commencement of the disease, the redness of the conjunctiva is very slight. It often exists only on the inside of the lids. Sometimes a few scattered vessels are seen coursing through the conjunctiva towards the cornea; in other cases, no enlarged vessels are perceived, so that the disease in this incipient stage is distinguished more by intolerance of light than by any direct signs of inflammation. Perhaps three or four enlarged vessels are discovered, running from either angle towards the cornea, or over its edge, evidently superficial, or even projecting above the level of the conjunctiva. Not unfrequently the inflamed vessels form a single considerable fasciculus. (*Fig.* 48.) Although in by far the greater number of cases, the redness is scattered, it sometimes happens that it is pretty general over the conjunctiva, even from the first. As the disease advances, the redness becomes increased, and the sclerotica also appears somewhat injected.

2. *Phlyctenulæ—Ulcers—Protrusions—Specks.* This ophthalmia is an eruptive disease. It affects the conjunctiva, not as a mucous membrane, but as a continuation of skin over the eye. One of its most remarkable symptoms is the existence of one or more phlyctenulæ or small pimples on the cornea. In many instances, a single minute elevated point, of an opaque white colour, near the centre of the cornea, is all that is to be seen of this kind; in other cases, numerous phlyctenulæ are present, some on the cornea, and others just at its edge. This last is a very common situation for them. They vary in size according to the part in which they appear, being commonly smallest on the cornea.

The phlyctenulæ may be absorbed; and then, if situated on the cornea, they generally leave a small *albugo*, the effect of that effusion of coagulable lymph which surrounds every circumscribed abscess, but which will, in general, be totally removed by absorption in the course of time. Occasionally it happens, that after an albugo is removed by absorption, a transparent *dimple* is left in the cornea, which is long of filling up. In some cases, we see the albugo begin to grow, rising above the level of the cornea, and spreading over it in an irregular manner; red vessels of considerable size running into it, and additional lymph being supplied to it, so as to form what I call *vascular speck*, which is a very tedious and troublesome symptom.

Fully as often, the phlyctenulæ suppurate, burst, and become ulcers, sometimes superficial and considerable in extent, more frequently deep and funnel-shaped. This symptom, which is preceded by an appearance of additional red vessels running to the phlyctenula, forms one of the most dangerous symptoms of the disease. Over the sclerotica, indeed, an ulcer, arising from the rupture of a phlyctenula, is of less consequence, but, on the cornea, the transparent inlet of light, an ulcer of any description is an event exceedingly to be dreaded. It is very apt to disfigure the eye; and by the opaque cicatrice, which it leaves behind, permanently to obscure vision.

The formation of an ulcer, especially if it be situated on the cornea, always produces an increase of pain, greatly aggravated on any attempt to move the eye.

It but too often happens that an ulcer penetrates gradually through the whole thickness of the cornea, into the anterior chamber. In many cases, this serious event must be ascribed to neglect or mismanagement. Through the little fistulous opening of the cornea formed by the penetration of an ulcer, the aqueous humour is suddenly discharged, and a small portion of the iris protruding, looks not unlike the head of a fly. Hence this symptom is termed *myocephalon*. This piece of the iris, unless drawn away from the cornea by belladonna, unites, by adhesive inflammation, to the opening through which it is prolapsed, the ulcer around it gradually contracts and whitens at the edge, the protruded portion of iris disappears, and a white indelible cicatrice of the cornea partially or entirely prevents vision. A cicatrice of the cornea is called a *leucoma*, in contradistinction to *albugo ;* the latter opacity being the result of effusion, not of ulceration. If the ulcer has extended deep into the substance of the cornea, and much more if it has penetrated through it completely, the leucoma which follows remains for life, although in the progress of growth, and after a length of time, it may contract considerably. The cicatrice resulting from a superficial ulcer may entirely disappear. Indeed, the cicatrice from a superficial ulcer is sometimes transparent from the first, forming a variety of *dimple*, different from the one already noticed.

If several phlyctenulæ form on the cornea at the same time, it sometimes happens that they unite with one another before they burst, so that the purulent matter they contain is infiltrated between the lamellæ, and thus a kind of onyx is formed. At other times, onyx appears at the lower edge of the cornea, independently of the phlyctenulæ.

In some cases of ulcer of the cornea, the progress of the ulcer is unimpeded till the whole thickness of the cornea is penetrated, except the lining membrane, which withstands for a time the ulcerative process, but being unable to support the pressure of the aqueous humour, is projected through the ulcer in the form of a small vesicle. This is what is called *hernia corneæ*. At last this vesicular protrusion gives way, the aqueous humour escapes, prolapsus of the iris follows, and a dense opaque cicatrice will be the result.

Where there has been an extensive prolapsus of the iris, through an ulcer of the cornea, the cicatrice or pseudo-cornea which is formed over the protruded portion of iris, is sometimes unable to sustain the aqueous humour, and is pressed forwards so as to form a partial *staphyloma*.

3. *Pain—Intolerance of light—Blepharospasmus—Epiphora.* The excessive intolerance of light, which in general attends phlyctenular ophthalmia, is one of the most distressing symptoms. The child (for children are the usual subjects of this disease) is often quite unable to open the eyes in the ordinary light of day, or by any act

of volition to expose them so as to permit a satisfactory examination of their state; all his attempts to look up are instantaneously interrupted by a strong spasmodic contraction of the eyelids; for whole days, weeks, or even months, a child affected with this disease will lie on his face in bed; or, if forced out of bed, he will stand pressing his eyes against his arm, and no persuasion will bring him to lift up his head or look at the light. The intolerance of light is always most severe during the day. In the evening it sometimes remits so much as to allow the patient to open his eyes, and enjoy vision to a considerable degree, for some hours.

It might perhaps be supposed that this excessive intolerance of light and spasmodic contraction of the orbicularis palpebrarum should attend only the worst cases, or where there is a great degree of inflammation. But it is not so. The mother or the nurse taking up the child, lays it across her lap, while the surgeon, receiving the head firmly between his knees, and laying hold of the eyelids, without suffering the conjunctiva to become everted or protruded, raises the upper eyelid, so as to expose the sclerotica; the cornea is turned up out of view, and it sometimes requires considerable management to elevate the upper lid so as to expose the cornea completely. But still this may be done, and before any prognosis can be given, must be done. In many cases, we are astonished when we thus examine the eye, to find only a very insignificant degree of redness, scarcely more than we should find were we to examine a healthy eye in the same way, the cornea often perfectly transparent and entire, or perhaps presenting a single minute spot of opacity, with a few red vessels running over the sclerotica. The excessive intolerance of light in many cases constitutes the only symptom, which has led Benedict to treat of it[2] as a separate disease under the name of *photophobia infantum scrophulosa.*

This symptom is attended with epiphora, and often by violent fits of sneezing. Whenever the patient voluntarily attempts to open the eye, or whenever we forcibly expose it, a gush of tears succeeds; the eye is thereby reddened, the eyelids swell, and if the exposure is repeated from time to time, the cheek becomes chafed and excoriated. A pustular eruption rises upon the face from the irritation of the tears, and the cheek sometimes becomes exceedingly swoln, red, and painful from the same cause.

There does not appear to be in general any very great degree of absolute or inflammatory pain attendant on phlyctenular ophthalmia, not even when the patient attempts to open the eye. If we let the child alone, he will lie all day in some dark corner of the room, without complaining much of pain. But so excessively disagreeable to him is the least access of light, that he will rather forego all his little amusements, both within and out of doors, than open his eyes. Moving the eyes, to look at the light, or at any object, brings on a sensation as if they were full of sand, and sometimes causes a feeling of intolerable glare and dazzling. Pain during the night, however, is not an unfrequent symptom. It seems to occur even during

sleep, for the child often awakes screaming with pain in the eyes. Commonly a great degree of itchiness of the eyes attends this disease, so that the patient rubs them much.

An anatomical fact, to which I have already had occasion to refer, may aid us in accounting for the extreme intolerance of light, spasmodic contraction of the eyelids, and epiphora which accompany scrofulous ophthalmia, even in cases where scarcely any redness is present; namely, that the lacrymal nerve, after supplying the lacrymal gland, goes to the conjunctiva and orbicularis palpebrarum, and may serve to establish a strong nervous sympathy between these parts. We see this sympathy called into action when any minute particle of dust fixes on the inside of the upper eyelid. We have then the same intolerance of light, spasm of the orbicularis palpebrarum, and rush of tears, which we meet with in phlyctenular conjunctivitis, so that it would appear that this disease, even in its incipient stage, excites very much the same train of effects which follows the irritation produced by a particle of dust on the inside of the upper eyelid.

The intolerance of light in this disease has, by one author,[3] been regarded as depending on an affection of the retina, an idea which appears to derive some degree of support from the fact, that, in the dusk the patient is able to open his eyes, whereas were this symptom dependant merely on the state of the conjunctiva, it would remain the same in obscure as in bright light, and be more marked in catarrhal than in phlyctenular ophthalmia. The evening remission is a peculiarity of the disease, which we cannot completely explain.

In one case which I saw, the intolerance of light and spasm of the lids had continued for more than a year. When at length they abated, which they did of themselves, without the influence of medicine, (the mother having neglected to attend at the Eye Infirmary,) the child groped with its hands, as if blind, although it saw; so strongly confirmed was the habit of using the sense of touch in preference to that of sight.

In another case, on the photophobia subsiding, we discovered the child to be amaurotic, although, until seized with the ophthalmia, it had seen perfectly.

4. *Ophthalmia tarsi—Iritis—Atrophia bulbi.* Other local symptoms besides those already enumerated, are often present. Very frequently we find this disease combined with ophthalmia tarsi. In many cases, we observe zonular inflammation of the sclerotica, and, although iritis is a much more frequent attendant on corneitis than on phlyctenular ophthalmia, yet we occasionally find the pupil small, with a want of lustre, or even slight discoloration of the iris, though generally without effusion or adhesion. Inflammation of the crystalline body, choroid, or retina, is still more rarely attendant on this disease. From neglect or mismanagement, however, it is sometimes allowed to end in internal scrofulous ophthalmia, characterized by nebulous capsule, contracted irregular pupil, unnatural hardness of the eyeball, and more or less amaurosis. Interrupted nutrition i

by no means an uncommon sequela of long-continued phlyctenular ophthalmia, so that the eyeball remains through life dwarfish or atrophic.

5. *Other scrofulous symptoms* may be detected in almost every case; as, eruptions about the head, sore ears, swelling of the upper lip, running from the nose, excoriation of the nostrils, enlarged lymphatic glands under the jaw, exostosis of the fingers, swoln joints, tabes mesenterica, &c. With some of these symptoms we often find the ophthalmia to alternate, being aggravated, for instance, when sore ears cease to run, and abating when they again begin to discharge. I have seen this ophthalmia repeatedly alternate with scrofulous swelling of the knee. The eruption on the scalp, which is generally observed along with this disease, is porriginous. Not unfrequently, an impetiginous eruption over the body is found to be present, especially in children who live much on milk.

6. *A tumid and hard abdomen, and disordered bowels*, commonly attend scrofulous ophthalmia. The stomach and bowels appear to be loaded with morbid secretions; and the evacuations are dark. The tumidness of the belly seems to be owing in part to muscular weakness.

7. There is considerable *general debility*, especially in cases of long continuance. The skin is loose and flabby, and sometimes a great degree of emaciation is present. The patient is hot and restless in the early part of the night, and sweats profusely towards morning. A great degree of fretfulness is produced by the disease, and prolongs its continuance.

Remote or predisposing causes. 1. *The scrofulous constitution* may be regarded as the chief remote, or predisposing cause of this ophthalmia.

That the scrofulous constitution very powerfully modifies local diseases, is a fact which must excite the attention of the most superficial observer. Indeed, by the term scrofula, we do not so much mean a disease of any particular set of organs, as a state of the whole system, predisposing different parts of the body to become affected with local diseases, and modifying those local affections which may arise from accidental causes.

The description commonly given of scrofula applies too exclusively to that form of the disease in which it appears as an affection of the absorbent glands. Considered as a state of constitution influencing the origin and progress of local diseases, the accounts given of scrofula have sometimes appeared to be contradictory to one another. These apparent contradictions have arisen from the variety of appearances under which the scrofulous diathesis presents itself, and from its different effects in different cases. For instance, this diathesis seems sometimes to hasten the progress of a local inflammatory disease, and at other times to prolong the process of inflammation. Beer[4] has distinguished different classes of scrofulous patients; and, indeed, it requires but little experience of scrofulous diseases to observe that those individuals whose texture throughout

is extremely lax, who have the nose and upper lip almost constantly swoln and scurfy, the abdomen uncommonly distended, and who are affected so frequently with chronic swellings of the lymphatic glands, form a sub-class sufficiently distinct from the general subjects of tubercles in the lungs. The latter are lively and irritable, and are rarely affected with the external lymphatic swellings, the crusta lactea, tinea capitis, ophthalmia tarsi, running from the ears, and diseased joints, to which the former sub-class are so very liable. Beer asserts, that the first sub-class are more subject to the pustular variety of scrofulous ophthalmia, and the second to the phlyctenular; and that the disease is generally much more tedious in the former than in the latter. He tells us also that the intolerance of light is not nearly so considerable in the first class as in the second; the pain not so acute, the long-continued spasmodic contractions of the eyelids not nearly so common; the disease not at all so apt to pass into iritis, but more liable to be attended by inflammation of the Meibomian follicles, and this sometimes passing into puro-mucous conjunctivitis.

Mr Wardrop has published in the second volume of the Edinburgh Medico-Chirurgical Transactions, an account of what he calls the *exanthematous ophthalmia*, which seems to be nothing else than the disease we are now considering. He says, indeed, that the scrofulous ophthalmia is a disease quite distinct from the exanthematous; but he neglects to point out a single diagnostic symptom by which the one could be known from the other, while his description corresponds exactly with that of phlyctenular ophthalmia given by Beer and others. Mr Wardrop admits that persons of a scrofulous constitution are very subject to the exanthematous ophthalmia, "from the same causes," he adds, "which render them also particularly liable to many other diseases; but neither the character of the ophthalmia," says he, "nor the eruptions with which it is connected, are necessarily derived from a scrofulous diathesis, nor does the disease appear in those alone where the scrofulous diathesis can be detected." This looks like a sort of apology for those who are the subjects of this disease. Not only is the term *exanthematous* as applied by Mr Wardrop, nosologically incorrect, but his assertion as to the non-scrofulous nature of the disease is unsupported by any proof, and the giving this out as a newly distinguished ophthalmia is, I think, improper.

Mr Christian, of Liverpool, says[5] he can distinguish the scrofulous from the porriginous ophthalmia, and thinks that the latter is excited by the contact of porriginous matter, carried by the fingers of the child, from the ears or head, to the eyes. There some plausibility in this, and the hint may very properly be adopted of preventing as much as possible the child from touching an porriginous or other eruption on its head, and afterwards conveying its fingers to the eyes. I believe, however, that Mr Christian porriginous ophthalmia is merely the disease we are now describing and that his scrofulous ophthalmia is chronic catarrhal ophthalm

in scrofulous patients. This last appears also to be the disease referred to by Lugol, when he speaks of scrofulous ophthalmia.

2. *Food—Air—Exercise—Clothing.* While without any hesitation we regard the scrofulous constitution as the chief predisposing cause of this ophthalmia, we must not omit to mention that other remote causes evidently operate in its production; namely, improper diet, want of air and exercise, and insufficient clothing. It is from the operation of these causes that this ophthalmia and other scrofulous diseases are so frequent in large and crowded towns, and prevail so abundantly among the children of the poor, who live in narrow streets and alleys, breathing an impure atmosphere, confined to a scanty and unnutritious diet, regardless of cleanliness and ill-protected from changes of weather.

3. *Climate.* Our variable climate is a powerful promoter of scrofulous ophthalmia, while in the south of Europe, in the inland parts of Italy for instance, this disease is rare, even among the poorest of the people, whose food is the least digestible and least nourishing.[6] We see the effects of climate on this disease in the rapid changes which it undergoes when the weather becomes either suddenly cold and wet, or dry and warm. All the symptoms are greatly aggravated by the former, and as remarkably relieved by the latter. New attacks, both in those who have and those who have not previously suffered from this disease, are most prevalent during north-easterly winds.

Exciting causes. 1. *Exposure to cold,* and especially to cold and wet weather.

2. *Measles, scarlet-fever, and small-pox* rouse into activity the scrofulous diathesis. These diseases themselves affect the eyes, and leave them tender, and apt to fall into this ophthalmia.

3. *Catarrhal ophthalmia,* brought on in the common way, is extremely apt to degenerate, in scrofulous children, into the phlyctenular.

4. *Excessive use of the eyes* on minute objects, and especially by candle light, is often the exciting cause of scrofulous ophthalmia.

5. *Teething* is a frequent exciting cause. It would appear that from the communications existing between the second and third divisions of the fifth nerve and the lacrymal nerve, teething excites lacrymation, blepharospasmus, and ultimately phlyctenular conjunctivitis.

6. *Injuries,* as those produced by particles of dust lodging in the folds of the conjunctiva, slight blows, and the like, are often the occasional causes of phlyctenular ophthalmia.

Prognosis. It is necessary to give a very cautious prognosis in this disease. Much depends on the patient's pursuing the treatment methodically, not only till the cure seems complete, but for a considerable length of time after. No disease is so apt to relapse; the parents should be made aware of this, and directed to make instant application whenever they observe a recurrence of any of the symptoms.

When ulcers are present on the cornea, specks must necessarily follow. These will prove more or less obstinate according to the depth of the previous ulceration, and will impede vision in proportion as they extend more or less over the pupil. Perforating ulcer, followed by protrusion of the iris, leaves almost uniformly a dense leucoma, with deformed pupil.

I have already mentioned the danger of iritis, retinitis, &c. supervening to phlyctenular ophthalmia. I may add that in after-life many become amaurotic, with hardness of the eye, and glaucoma, who in youth suffered from this disease. Eyes which have been long and severely affected with scrofulous inflammation are never so good afterwards, and are more apt than others to become amaurotic, if they are much fatigued, or if other detrimental causes come into operation, such as the use of tobacco, alcohol, &c.

Treatment. We are obliged to speak of the treatment of phlyctenular ophthalmia in very different language from what we employ in advising remedies for almost any other inflammatory disease of the eye. In other ophthalmiæ, we say, Follow this plan of treatment which we recommend, and the disease will speedily be overcome. We speak thus of the catarrhal ophthalmia, and of several others, but we cannot speak in this way of the phlyctenular. We are forced to confess that in many cases this ophthalmia proves rebellious. If it be asked why it does not yield even to the best directed treatment, we answer this question by proposing another; namely, Why does an inflamed gland of the neck in a scrofulous individual prove so troublesome, going on to suppurate in spite of every means adopted to promote resolution, and after it has suppurated and burst, continuing to discharge for years? The *scrofulous constitution* is the cause of the extreme tediousness of this ophthalmia as well as of the frequently intractable nature of other scrofulous diseases; and till we discover means for curing scrofula, this ophthalmia will continue occasionally to mock, by its stubbornness, even the best and most carefully pursued plan of cure.

Is it incurable then? Are we to do nothing for it; but shake our heads, and leave the eyes to be destroyed? Not at all. Much may be done to relieve this disease. Although it is very difficult to cure it thoroughly, especially when the patient continues exposed to the influence of the same causes which originally produced it, yet it is rare indeed that medical treatment does not greatly moderate the symptoms, and avert those changes in the transparent front of the eye, which in neglected cases are so often the causes of loss of sight. But when the practitioner does meet with cases, as sometimes he must do, which receive no benefit for weeks or months, but perhaps rather get worse, notwithstanding all that is done for them, he must not blame himself too much, but reflect on the intractable diathesis with which, in such cases, he is called to contend. This he cannot change, and but too seldom can ameliorate even in the smallest degree.

In the treatment of this disease, it is necessary constantly to be

in mind that it depends on a constitutional cause. To endeavour to relieve the local affection, therefore, will not be sufficient. We must improve the general health.

General remedies. 1. *Bleeding.* General blood-letting is hardly ever required; nor need local bleeding be had recourse to, unless considerable febrile excitement, as well as local distress, be present. When the inflammatory action runs higher than ordinary, or where it is suddenly or violently augmented by the formation of ulcers on the cornea, it is proper to moderate the impetus of the blood by the application of leeches to the eyelids or the temple. If the constitution is not as yet impaired by long continuance of the disease, and the employment of many debilitating remedies, repeated recourse must be had to the use of leeches, so long as the redness of the conjunctiva is considerable, and the intolerance of light acute. It must be kept in mind, however, that not unfrequently we may dispense with bleeding entirely, either by putting the patient under the influence of tartar emetic, or by the administration of the sulphate of quina; and that by depletion alone, no case of this disease can ever be cured. On the contrary, repeated bleedings, without the use of other remedies, reduce too much the general strength, and render the eye more susceptible of destructive changes.

2. *Emetics and nauseants.* One of the most powerful and successful methods of treating phlyctenular ophthalmia is by means of tartar emetic, either in such doses as to produce vomiting; in smaller quantities frequently repeated, so as to excite nausea; or combined with a purgative. There is perhaps no remedy in the whole materia medica which possesses equal powers of a *sedative* kind in this disease. It reduces very considerably the necessity of general and local blood-letting.

I generally commence the treatment with an emetic, either of ipecacuan or tartrate of antimony, and uniformly with good effects. Four grains of the tartrate being dissolved in 6 ounces of water, a table-spoonful is given every five minutes till free vomiting is produced.

In cases where there is considerable quickness of pulse, and heat of skin, I frequently put the patient on a course of nauseants, or of emeto-cathartics. For instance, to an adult a mixture may be given of 1 or 4 grains of tartar emetic, with from 1 to 2 ounces of sulphate of magnesia, dissolved in a pound of water. Of this solution 2 or 3 table-spoonfuls may be taken every half hour till vomiting is excited; after which, the dose is to be repeated at intervals of three, four, or six hours, as circumstances may require. This is the method to be followed in acute cases. In chronic cases, the nauseant may be exhibited in longer intervals. It may then be more conveniently exhibited in pills; each pill containing from a quarter to half a grain or more of the tartar emetic.

In cases of children, the same solution of tartar emetic and salts may be employed, or a solution of tartar emetic by itself, or powders of the same rubbed up with a little sugar. From the 12th to the

6th of a grain may be given, according to the age of the child, thrice a-day. When there is much febrile excitement, this plan will often prove effectual, while purgatives or tonics would produce little or no good.

3. *Purgatives.* In children labouring under phlyctenular ophthalmia, there is commonly a full and hard abdomen, and a loaded state of the stomach and bowels. Even in feeble and emaciated children, it will usually be found, that, by the exhibition of purgatives, a large quantity of morbid fæculent matter will be discharged. In such cases, the administration of purgatives is followed by marked benefit; and without these, other remedies avail but little. In recent cases, a purge of calomel, with jalap, rhubarb, or scammony, will often be sufficient to remove the attack of ophthalmia altogether. Such a purgative is to be repeated at intervals of two, three, or more days, according to the urgency of the symptoms. It not only empties the bowels; but reduces very powerfully the impetus of the blood in the affected part, increases the action of the absorbents, and restores to a healthy state the secretions of the digestive organs. It proves, in short, alterative, as well as depletive; and its use as such may be persisted in, in many cases, for a length of time, with very decided benefit. I have found the purgative plan to be more useful than any other, in those cases in which an impetiginous eruption over the body accompanies the affection of the eyes. Care, however, must be taken not to push its debilitating action too far.

4. *Sulphate of quina and other tonics.* There are several tonic remedies, which prove strikingly beneficial in the treatment of phlyctenular ophthalmia.

After a trial of numerous and various internal remedies in this disease, I have found none so useful as the sulphate of quina. It exercises a remarkable power over the constitutional disorder which attends this ophthalmia, and thereby over the local complaint. The dose which I employ is generally a grain thrice a-day; in very young children, half a grain; and in adolescents or adults, 2 grains. It may be given rubbed up with a little sugar; but it appears to act best when administered in solution. For this purpose, I use the acidum sulphuricum aromaticum, to which I add a sufficient quantity of syrup and water. In most instances, the effects are very remarkable. Although I have met with a few cases which appeared to resist its beneficial influence, in most of the little patients to whom I have administered sulphate of quina, it has acted as a charm; abating, commonly in a few days, the excessive intolerance of light and profuse epiphora, promoting the absorption of phlyctenulæ, and hastening the cicatrization of ulcers of the cornea. As soon as the stomach has been cleared by an emetic, and the bowels put to rights by repeated doses of calomel with rhubarb, or some other such purgative, the use of this medicine may be begun, unless the pulse is very quick and the skin hot, when small doses of tartar emetic will be preferable, or when an impetiginous eruption is observed on the

surface of the body, in which case a course of purgatives ought to be adopted.

I cannot forbear quoting from the journals of the Glasgow Eye Infirmary the two following cases, illustrative of the good effects of sulphate of quina.

Case 216.—Jane Thomson, aged nine, was admitted on the 23d of July 1828, with phlyctenular ophthalmia of the right eye, of 14 days' standing. There was a deep ulcer near the centre of the cornea, surrounded by a broad effusion of lymph; and there was an onyx at the lower edge of the cornea. She was affected with night-sweats, and was much reduced in general health by bleeding, purging, and blistering. She was ordered to take 3 grains of quina daily, a drop of the nitras argenti solution was applied to the eye, and she had the murias hydrargyri collyrium.

On the 24th, the onyx was all but gone. On the 27th, the ulcer was reported as contracted. On the 29th, on account of an attack of bowel complaint, she was ordered 2 grains of calomel with a quarter of a grain of opium at bedtime. After this, the case continued steadily to improve, the ulcer cicatrized, the eye became strong, and the leucoma grew thin. In all probability, the cornea would speedily have been penetrated by the ulcer, if the depletory treatment had been persisted in, which this patient was undergoing before she came to the Eye Infirmary. Within 24 hours, the sulphate of quina had evidently arrested the progress of the disease.

Case 217.—James Tassie, aged eight, was admitted on the 15th of August 1828, with phlyctenular ophthalmia of the right eye. He had been troubled with this complaint, more or less, for seven years. There was formerly a considerable albugo on the right cornea, but it had diminished much till within a fortnight before his admission, when a relapse took place. The cornea appeared to be rough and nebulous, but the intolerance of light was so great that it was with difficulty that any part of it could be exposed. The nitras argenti solution was applied, and he had a solution of tartar emetic, in divided doses, till vomiting was produced. Next day he could open the eye better, and an onyx was now observed at the lower edge of the cornea, which had not been perceived on the previous day. He was ordered to take a grain of sulphate of quina thrice a-day, and to use the murias hydrargyri collyrium. By the 18th, the onyx was gone. The extract of belladonna was applied to the eyebrow and forehead, some fears being entertained regarding the state of the iris. By the 20th, the intolerance of light having considerably subsided, the cornea could be more completely seen. The centre of it was found to be perforated by an ulcer, and the pupil contracted. On the 22d, the eye continued easier, but the iris was observed to be everywhere in contact with the cornea. The sulphate of quina, belladonna, and collyrium, were continued. On the 27th, the iris appeared to be returning a little into its natural place, the pupil was partly visible, and he saw a little with the eye. On the 28th, the pupil was evidently expanding and the cornea clearing. By the 1st of September, the pupil was free of the cornea, except at its inner edge, where it still adhered by a single point. By the 16th, the iris was entirely free. Soon after this, the ulcer of the cornea cicatrized, the speck gradually cleared, and the eye retained a very considerable share of vision.

This was one of the most remarkable and pleasing recoveries from penetrating ulcer of the cornea, and involved iris, which I have met with. The recovery was mainly attributable to the salutary operation of the sulphate of quina on the inflammatory affection, and to the mechanical effect produced by the belladonna.

Chalybeates stand next to the sulphate of quina among the tonic medicines worthy of confidence in the treatment of the scrofulous ophthalmiæ. The precipitated carbonate of iron, and the tartrate of potash and iron, are the forms which I have found most useful.

They are more effectual, however, in the pustular than in the phlyctenular ophthalmia.

The mineral acids, and especially the sulphuric, will also be found useful.

We may set down the cold bath as a very efficient tonic in scrofulous ophthalmia; but it is not to be employed till after the acute symptoms have subsided. At an earlier period, the tepid bath will prove soothing and refreshing, and ought to be frequently employed. A tepid salt-water bath is highly useful. I have known the tepid pediluvium every night for weeks or months together very serviceable; also warm fomentations of the belly, as in infantile remitting fever.

The employment of tonics, both medicinal and dietetical, must be continued long after all the inflammatory symptoms have disappeared, in order, if possible, to communicate to the constitution that degree of vigour, which may enable it to resist any tendency to relapse, which may still linger in the eyes, and which, were this precaution not adopted, might, on exposure to the slightest exciting cause, lead to a new and severe attack.

We may class change of air among the tonic remedies for this disease or rather among the preventives, which are to be employed after a first attack is subdued. A dry warm inland situation is preferable to the sea-coast. The glare from the sea is very apt to aggravate slight attacks, and give rise to relapses.

5. *Antacids.* There is reason to believe that phlyctenular ophthalmia frequently depends on acid generated in the stomach, and proceeding into the bowels, mixing there with the bile, and producing green stools and general irritation. When this is the case, relief may often be obtained by using antacids. Carbonate of ammonia, with tincture of gentian, as recommended by Dr Charles Armstrong[7] in common cases of scrofula, I have employed with good effect. An excellent antacid and laxative remedy in this disease is the common combination of rhubarb and super-carbonate of soda.

6. *Mercury.* Calomel is very often administered in phlyctenular ophthalmia; more frequently, however, as a purgative than as an alterative. That this medicine is often injurious to children does not admit of doubt. That their constitutions are shattered by an indiscriminate use of calomel, and that in this way they are rendered more susceptible of suffering from the exciting causes of scrofula, is a truth which, at the present day, is overlooked to a most lamentable degree.

Given as an alterative in phlyctenular ophthalmia, I have frequently known mercury prove injurious, because mistimed; that is to say, it was administered before the irritation attending the acute stage of the disease was moderated by depletion. After local bloodletting, and the use of evacuants, we sometimes find decided advantage from the exhibition of blue pill, or even of calomel with opium. In some cases this combination may be pushed with advantage, till the mouth is affected; as was done in the following case.

Case 218.—Isabella Fitzsimmons, aged nine, was admitted at the Glasgow Eye Infirmary, 3d August 1831, with the following symptoms. Numerous phlyctenulæ round the upper edge of the right cornea, considerable reticular inflammation of the conjunctiva; tongue white; is feverish and tosses during the night.

A solution of tartrate of antimony, in divided doses, was ordered as an emetic, and the 4 grain solution of nitrate of silver was applied to the eye. On the 5th, the phlyctenulæ was observed to be diminishing in size, and the redness was less. On the 9th, the symptoms still abated. On the 12th the phlyctenulæ were all but gone.

On the 17th, a new phlyctenula was observed at the lower edge of the cornea. She was ordered an ounce of sulphate of magnesia. On the 19th, there was general vascularity of the conjunctiva. On the 21st, a small ulcer was present on the centre of the cornea. She was ordered 12 grains of sulphate of quina in a 12 ounce solution; a table-spoonful to be taken thrice a-day. On the 2d Sept. the inflammation was found to be increased, with an onyx at the lower edge of the cornea. Six leeches were applied to the right lids; a dose of calomel and jalap administered, and the quina augmented to ℈i in 12 ounces. Next day, a blister was applied behind the ear. On the 8th, the onyx was less. On the 9th, the quina was increased to ʒi. On the 13th, a considerable effusion of lymph was observed on the internal surface of the cornea, below the level of the ulcer. The eye was evidently in imminent danger. Extract of belladonna was smeared on the brow and upper lid. The quina was continued, but as this is a remedy of little, if any, power over adhesive inflammation, 2 grains of calomel, with the third of a grain of opium, were ordered at bedtime.

On the 15th, the pupil was somewhat dilated, and the lymph on the internal surface of the cornea was less. On the 16th, the lymph was much diminished. On the 18th, it was all but gone. The ulcer was still deep, but smooth. Numerous red vessels were seen creeping over the lower edge of the cornea. The pupil still kept dilated. The remedies were continued as ordered on the 13th.

On the 22d, the pupil was widely dilated, the lymph completely gone, the ulcer contracted, and the cornea free of red vessels. The belladonna was omitted. On the 27th, the calomel and opium were stopped. On the 1st November, a very small leucoma was the only remaining symptom.

This case affords a good example of the spread of inflammation from the investing membrane of the cornea to its proper substance, and from this to its lining membrane. It shows the danger of trusting to quina in every circumstance of scrofulous ophthalmia, and the favourable influence of calomel and opium in adhesive inflammation of the cornea.

7. *Diaphoretics.* Keeping up a healthy action of the skin is of much importance. This may be done by the tepid bath every second or third day, followed in adults by the use of the flesh-brush. Dover's powder at bedtime sometimes proves useful, by promoting a healthy action of the skin, as well as soothing irritation, and procuring sleep. In cases where the perspiration is immoderate, this medicine is not less remarkable for its good effects than where the surface of the body is dry and husky. Tartar emetic operates also with good effect on the skin, and sympathetically on the conjunctiva.

8. *Diet.* During the continuance of an attack of active inflammation, abstinence from animal food, and from all kinds of fermented and heating liquors, should be strictly enjoined; but when the acute symptoms have subsided, and the disease has assumed a chronic character, the patient ought to be put upon rather a generous diet. As there can be no doubt that unwholesome food is one of the chief

causes of this ophthalmia among the poor, it is of much importance to procure for the patients in these circumstances a more invigorating diet. It is necessary strictly to forbid the use of articles likely to derange the stomach; as, pastry of every sort, comfits, vegetable jellies, and preserves; and indigestible substances, as, unripe fruits, nuts, raisins, and the like.

9. *Temper.* This disease is extremely apt to render the child fretful, and by mismanagement to lay the foundation of bad temper, which, in its turn, tends much to prolong and aggravate the symptoms. We find in good-natured children, and in those who are under proper management, that the disease disappears much more readily; while in spoiled children, who cry perhaps for hours after the eyes are examined, or after the application of any remedy, it is apt to become almost incurable. It is of much importance to excite hope in the patient.

10. *Early rest.* "Si enim quid est juvans oculos, est somnus ipse."[8]

11. *Position in bed.* The head should be raised as much as possible during the night. On no account, ought the child to be suffered to lie burying its face in the pillow.

Local remedies. 1. *Shading the eyes.* The morbid irritability which marks this disease so strikingly through all its stages is to be relieved by wearing a broad green shade over the forehead; and by avoiding all employment of the eyes upon minute objects, especially in a strong light. It will not be necessary to confine the patient to a dark room, nor to forbid him going abroad in fine weather. We often see children, labouring under this ophthalmia, having handkerchiefs bound over their eyes, especially when they are taken out of doors. This practice is decidedly injurious, heating the eyes too much, adding to the intolerance of light, and often producing a squint, if one eye only is covered.

2. *Evaporation.* In recent slight attacks, the inflammation, pain, and irritability, may be moderated by the use of evaporating and slightly astringent lotions, applied tepid or cold according to the feelings of the patient. In most instances, they agree better in the tepid state. A decoction of poppy-heads, with a few drops of alcohol; water, acidulated with a little vinegar, and to which a small quantity of sweet spirit of nitre is added; a weak solution of acetate of ammonia; a little rose water; or a solution of 1 grain of corrosive sublimate in 8 ounces of water, will often answer the purpose. The application of cold water to the eyelids, face, and head, generally gives relief in this ophthalmia; but in many cases the reaction which follows is hurtful. The same may be said of alum curd, and vinegar poultices, enclosed in a thin linen bag, and laid over the lids at bedtime.

3. *Fomentations.* When the symptoms are in any degree severe or of long continuance, warm soothing applications will be found more useful than cold ones. With a bit of sponge or flannel, the eyes may be fomented once or oftener in the day with hot decoction

of chamomile flowers, or of poppy-heads, or with a hot infusion of opium. Much relief is experienced from exposing the eyes to the steam of warm water, or the vapour of laudanum, or camphor, raised by means of a cupful of hot water. Belladonna and hyoscyamus in vapour or in fomentation are of great service in relieving the intolerance of light. A solution of 1 grain of corrosive sublimate, and 6 grains of sal ammoniac, in 8 ounces of water, with 2 drachms of vinum belladonnæ, is the collyrium which I have found the most useful. It is to be used warm, thrice a-day; and after the eyelids are carefully bathed with it externally, for the space of five minutes, a little of it ought to be allowed to flow in upon the eye. Warm poultices during the night are often useful. They are to be made with crumb of bread, warm water, and a little fresh butter; and not with milk.

4. *Scarification* of the inside of the eyelids, especially in chronic cases, where the palpebral conjunctiva is much loaded with red vessels, will be found one of the most valuable means of cure. In cases of vascular speck, division of the fasciculus of vessels running over the sclerotica to the albugo, can scarcely be dispensed with; no other remedy having the same power in checking this very annoying and dangerous symptom.

5. *Counter-irritation.* In scrofulous subjects we frequently find that the occurrence of disease in one part relieves another part which was previously suffering. Imitating this natural conversion of disease, we employ blistering in scrofulous ophthalmia, and generally with great benefit. The intolerance of light is often suddenly removed by this remedy, the child being enabled, in a few hours after the blister rises, to open its eyes, although it had not done so for months before. The temples, behind the ears, the crown and back of the head, and the nape of the neck, are the situations generally chosen for the application of blisters. The last is the most painful, but not the least effectual. In general, the discharge ought to be kept up, by the use of some stimulating dressing; or, if this is not done, a quick succession of blisters ought to be employed.

Friction on the nape of the neck with tartar emetic ointment is sometimes had recourse to in this disease, for the purpose of bringing out a crop of pustules. This is a practice much more painful than blistering, the pustular eruption sometimes spreads over the body and causes considerable constitutional disturbance, the pustules, if considerable in size, leave indelible pits, and, from mismanagement of the remedy, large portions of skin are sometimes made to slough; so that on the whole blistering is preferable. Dr Salomon regards the tartar emetic eruption, as the only sure remedy for the intolerance of light.[9]

Issues on the neck or on the arm are beneficial, both in relieving the symptoms of phlyctenular ophthalmia, and in preventing relapses.

6. *Stimulants* applied to the inflamed surface of the eye, in this disease, are decidedly useful. Indeed it is scarcely possible to effect

a cure without them. The impetiginous state of the conjunctiva, or in other words of the skin covering the eye, in this ophthalmia, not merely bears stimulants, but like most other chronic cutaneous diseases, is benefited by their application, if they be well chosen, carefully used, and properly timed. They often act as the best local sedatives, if applied after the acute inflammatory excitement is subdued by the general remedies already enumerated. Employed before this is effected, they will scarcely fail to prove hurtful. In this respect the treatment of phlyctenular ophthalmia is directly contrary to that of the puro-mucous inflammations of the conjunctiva; for in them we employ stimulants from the very first, but in the phlyctenular we must delay, till the symptoms of irritation are somewhat abated.

Various stimulants have been used in scrofulous ophthalmia; but the nitras argenti solution and the red precipitate salve are the most deserving of confidence. Next to them, I would place the vinum opii. Whichever be selected, its application must be continued with regularity once a-day, or once every two days, the child being laid in the horizontal position, the head fixed between the knees, and the lid opened so as fully to expose the diseased membrane.

The solution of 4 grains of the nitras argenti in 1 ounce of distilled water is the stimulant which I generally employ. It evidently possesses very considerable power in abating the vascularity of the conjunctiva, hastening the absorption of phlyctenulæ, cicatrizing ulcers, and clearing specks of the cornea. The relief which it affords to the intolerance of light is not the least of its good effects. We not unfrequently observe that a single application of this remedy will effect so much relief by next day, that the patient is able in a moderate light to keep the eyes half open, without uneasiness, although previously he could not bear the least accession of light. In producing this effect, it probably operates by inducing the healing of minute ulcerations, and the contraction of enlarged blood-vessels, both of which give rise to the sensation of sand in the eye, to spasm of the lids, and epiphora. Whenever ulceration is present on the cornea, recourse should be had to the solution of nitras argenti. A stronger solution than that of 4 grains to the ounce may be employed, and with a small camel-hair pencil applied directly to the surface of the ulcer, without permitting the solution to spread over the rest of the eye.

The staining of the conjunctiva of an indelible olive hue, and the black cicatrice of the cornea, which sometimes follow the use of nitrate of silver, are serious objections to this remedy. I am unable to say any thing farther regarding the latter effect, than simply that I am convinced of the fact. The former effect is the result only of a long-continued application of the solution in question, and may therefore be avoided.

7. *Solid caustic.* When an ulcer threatens to penetrate deep into the substance of the cornea, or when it has already perforated it, it is proper to touch the ulcer, or, if there is prolapsus of the

iris, the myocephalon, every second or third day, with a pencil of lunar caustic, filed to a sharp point. Scarpa has given[10] the best account of the effects of this remedy, to which I shall again have occasion to refer, under the head of *Ulcers of the Cornea.*

8. *Belladonna.* The case of James Tassie, already detailed at page 423, strikingly illustrates the utility of applying the extract of belladonna in cases of central ulcer of the cornea. Even when the edge of the pupil is involved in such an ulcer, the dilating power of the belladonna may be sufficient to free it, and thus to preserve the pupil entire. In cases of perforating ulcer near the edge of the cornea, I am inclined to refrain from the use of belladonna; for, while the dilatation cannot, in this case, be carried so far as to remove the iris from the vicinity of the ulcer, I believe the state into which the iris is thrown, is apt to favour rather than prevent prolapsus.

Belladonna is of great service in subduing the intolerance of light; indeed, it may be regarded as a specific for this distressing symptom. The best mode of applying it, is to expose the eyes to its vinous solution, raised into vapour, by means of a tea-cupful of boiling water. An ointment, containing extract of belladonna, rubbed round the eye, is serviceable; as is also the collyrium of murias hydrargyri with vinum belladonnæ, already noticed.

Relapses. No disease is so apt to recur as phlyctenular ophthalmia. It is therefore necessary for children who have once suffered from it to be submitted, from time to time, to the inspection of their medical attendant, who must endeavour promptly to subdue every symptom of a re-attack, and to conduct his patients safely through that period of life which is most exposed to the disease. In this way much mischief will easily be prevented, which, should the disease be neglected, may require years to remove, or prove altogether beyond remedy.

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[1] *Conjunctivitis scrofulosa. Scrofulous ophthalmia.*

[2] Beiträge für practische Medizin und Ophthalmiatrik; Vol. i. p. 3; Leipzig, 1812.

[3] Mirault, Archives Générales de Médecine; Tome xx. p. 477; Paris, 1829.

[4] Lehre von den Augenkrankheiten; Vol. i. p. 593; Wein, 1813.

[5] Glasgow Medical Journal; Vol. i. p. 32; Glasgow, 1828.

[6] Weller, Krankheiten des menschlichen Auges. p. 469; Wien, 1831.

[7] Essay on Scrofula; in which an Account of the Effect of the Carbonas Ammoniæ, as a Remedy in that Disease, is submitted to the Medical Profession; London, 1812.

[8] Fallopius.

[9] Ammon's Zeitschrift für die Ophthalmologie; Vol. ii. p. 329; Dresden, 1832.

[10] Trattato delle principali Malattie degli Occhi; Vol. i. p. 280; Pavia, 1816.

SECTION X.—PUSTULAR OPHTHALMIA.[1]

The pustular variety of scrofulous ophthalmia is distinguished from the phlyctenular in the following respects.

1. Instead of minute elevated points, on the cornea, or close to its edge, we observe in the present disease, one or more pretty large aphthæ, which bursting, form broad elevated ulcers, generally at the distance of half a line or a line from the edge of the cornea. Although we call this disease pustular ophthalmia, the eruption which takes place on the conjunctiva, is not properly one of pustules. No purulent matter is discharged when they burst, but only a watery fluid, so that they are rather aphthæ than pustules.

2. The redness, instead of being fascicular is rather reticular. It radiates commonly round the pustules, but is sometimes pretty generally spread over the conjunctiva, and is occasionally attended with small ecchymoses under that membrane.

3. The pustular ophthalmia is often combined with catarrhal conjunctivitis.

4. There is much less intolerance of light in pustular than in phlyctenular ophthalmia, often none, and never the continued blepharospasmus so characteristic of the latter disease.

5. We never meet with pustular ophthalmia in teething children. The common subjects are children of 10 or 12 years of age, and not unfrequently young adults.

6. The pustular ophthalmia is less dangerous and more tractable than the phlyctenular, into which, or into the scrofulo-catarrhal, it sometimes has a tendency to pass.

Treatment. Pustular ophthalmia generally yields readily to a few simple remedies.

1. The eye is to be touched once a-day with a solution of 10 grains of nitrate of silver in an ounce of distilled water, and bathed thrice a-day with a solution of 1 grain of muriate of mercury in 8 ounces of water.

2. After a smart dose of calomel and jalap, the patient ought to take from 10 to 20 grains of precipitated carbonate of iron thrice a-day.

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[1] *Aphthous inflammation of the conjunctiva* of Morgan.

SECTION XI.—MORBILLOUS AND SCARLATINOUS OPHTHALMIÆ.

A certain degree of conjunctivitis always attends measles and scarlet fever, but is in general much less severe than the variolous inflammation of the eye. In measles and scarlet fever, the change

which the skin undergoes, amounts to little more than vascular congestion, and the conjunctiva, a prolongation of skin, betrays therefore little more during the presence of these diseases, than some degree of redness, with intolerance of light, slight pain, and epiphora. Occasionally, however, we meet with phlyctenulæ, onyx, and ulcers of the cornea, brought on by the morbillous and scarlatinous ophthalmiæ, particularly when the subject is scrofulous. Indeed, it is difficult to distinguish either of these ophthalmiæ from the scrofulous till the eruption of the skin makes its appearance. On the other hand, we often hear of the dregs of the measles or scarlet fever producing affections of the eye and eyelids. By this, is generally meant that the scrofulous diathesis has been called into action by these diseases, and that ophthalmia tarsi, or phlyctenular conjunctivitis has been the result.

In measles there is a catarrhal affection of the Schneiderian membrane, with sneezing and cough, and occasionally the attending conjunctivitis is not so much eruptive as blenorrhœal. I have seen cases in which the eye had been destroyed by severe puro-mucous ophthalmia excited by measles. In scrofulous subjects, exposed to cold after measles, a puro-mucous inflammation of the conjunctiva, or scrofulo-catarrhal ophthalmia, is a frequent occurrence. In weakly ill-nourished infants, cough, great emaciation, and ulceration of the cornea, ending in staphyloma, are not uncommon sequelæ of measles.

In some rare cases of scarlatinous ophthalmia, the iris and capsule of the lens become affected. I operated, some time ago, on a boy of about eight years of age, in whom specks of the anterior hemisphere of the capsule were brought on in this way.

Treatment. The affection of the eye in measles and scarlet fever, does not in general require active treatment. The eyes should be guarded from strong light, bathed occasionally with tepid water, and the bowels kept freely open. If the symptoms are more than commonly severe, leeches may be set on the temples, and blisters applied behind the ears, or to the nape of the neck. The nitras argenti solution will be found highly useful, whether the ophthalmia be eruptive or puro-mucous. Sulphate of quina may be given internally with good effects.

SECTION XII.—VARIOLOUS OPHTHALMIA.

In former times, small-pox proved but too often the cause of serious injury to the eyes, or even of entire loss of sight. It was by far the most frequent cause of partial and total staphyloma. But since the introduction of inoculation, and still more of vaccination, such injurious effects from variolous ophthalmia, are comparatively rare.

Symptoms. In most cases of small-pox, pustules form on the external surface, and on the margins of the eyelids. When they are numerous, as in confluent small-pox, they cause such swelling of the lids as completely to close the eyes. As the disease proceeds, matter is discharged partly from the Meibomian follicles, partly from the variolous pustules, the eyelids are glued together so that the eyes cannot be opened for days, and merely from this state, without any pustules being formed on the conjunctiva, the eyes are irritated and painful. At last, as the disease subsides, the swelling of the lids falls, so that they are again opened, and the eyes may be found uninjured. It is in this way that the vulgar talk of persons being blind in small-pox for so many days, and recovering their sight. But although the cornea has not suffered in such cases, the eyelids and the lacrymal apparatus are often left in an injured state; and not unfrequently small-pox proves the exciting cause of scrofulous affections of the eyes and eyelids, which may continue troublesome for years. The small-pox pustules on the lids are apt to destroy the eyelashes, to leave red marks and scars, render the edges irregular, and liable to inflammation and excoriation from slight causes, and to produce ophthalmia tarsi, and very frequently trichiasis and distichiasis. Chronic blenorrhœa of the lacrymal sac, and phlyctenular conjunctivitis, are also frequent sequelæ of small-pox.

Schemes have been proposed for preventing the pustules of small-pox from spreading to the face, or at least for moderating the effects of the eruption. We find that this disease is apt to attack with peculiar severity any part of the surface of the body labouring at the time under accidental irritation, and hence it has been supposed that soothing applications might moderate the eruption and its effects. Covering the face with a cloth spread with cerate, and fomenting it from time to time with chamomile decoction, have been used for this purpose, and can do no harm. When the pustules on the eyelids are fully matured, we may afford considerable relief by pricking them one by one with a needle, so as to evacuate their contents; and by carefully removing the crusts which form after the pustules burst, having first softened them with some mild ointment. The lids are frequently to be bathed with tepid milk and water, and bits of soft rag moistened with the same are to be laid over them.

There is in every case of small-pox, some redness of the conjunctiva, constituting the *primary variolous ophthalmia.* But danger has chiefly been apprehended from the formation of a variolous pustule or pustules on the cornea. A pustule on the cornea, forming at the time of the general eruption, would certainly be extremely apt to prove destructive. The pustule bursting, an ulcer would be formed, which would probably deepen and spread. If the cornea were penetrated, the iris would advance and adhere to the cornea, and the pupil might thus be obliterated. A considerable portion of the cornea being destroyed by ulceration, partial staphyloma might

be the result. In bad cases, almost the whole of the cornea might be destroyed, by infiltration of matter and ulceration, and total staphyloma would then ensue.

During the suppurative stage of small-pox it is difficult to say what extent of mischief may be going on in the eye, under the closed and swoln eyelids. If the patient feels pain in the ball itself, with dryness, stiffness, and a sensation of sand in the eye; if the uneasiness be much increased on attempting to move the eye, or on exposing it to light even through the swoln lids; and if in addition to the matter discharged from the pustules on the edges of the lids and from the Meibomian follicles, there is a frequent discharge of hot tears, then it is probable that there is acute variolous conjunctivitis. If the eye is easy, only shut up from the state of the lids, there is probably no danger.

The eyes are not safe, even after the small-pox pustules over the body have blackened and the scabs fallen off. I have seen both pustule of the cornea and onyx, produced after the general eruption was completely gone. This has been called, with sufficient propriety, *secondary variolous ophthalmia*. It generally occurs about the 12th day of the eruption, when the pustules over the body are subsiding, but sometimes as late as five or six weeks after the patient has recovered from the primary disease. It is not considered so severe an affection as the primary, but is still dangerous in regard to vision.

A dull whitish point is observed in the cornea, with surrounding haziness; the whiteness becomes more extensive, amounting perhaps to the 12th of an inch in diameter, and then the part becomes yellow. If two or more such points should form, the whole cornea is rendered nebulous; or this effect may be produced even from one large variolous pustule. An onyx at the same time may appear at the lower edge of the cornea. The sclerotica is reddened. Pain and epiphora are excited on exposure to light.

The secondary variolous ophthalmia seldom leads to destruction of the cornea, unless the case is altogether neglected. By proper treatment, the matter of the pustules or onyx is generally absorbed. In other cases, ulceration takes place, leaving, after cicatrization, a permanent leucoma or white speck. The surrounding haziness of the cornea is gradually dissipated; vision is injured according to the situation and size of the leucoma. By the formation of an artificial pupil, vision may in many cases of this sort be restored. Even when partial staphyloma has formed, this operation is sometimes applicable. The whole cornea is occasionally destroyed by suppuration and ulceration in the course of secondary variolous ophthalmia, and the result is total staphyloma. This rarely happens unless there is a high degree of secondary fever. Indeed, we seldom meet with secondary variolous ophthalmia, unless where the skin is hot and dry, the pulse quick, and the other symptoms of synocha present. When the constitutional symptoms run high, and the eye falls into a complete phlegmonous ophthalmitis, the case is

apt to terminate fatally. Puncturing the eye under such circumstances, as Louis[1] recommended, may be the means of saving the life of the patient.

The general notion, that pustules are apt to form on the conjunctiva and cornea, at the time of the general eruption, has been opposed by Dr George Gregory. In a report[2] of some observations of his at the Westminster Medical Society, he is made to say, that except the mucous membrane of the fauces, larynx, and trachea, no mucous membrane is capable of taking on the variolous action. Even the eye, which so frequently suffers from small-pox, Dr Gregory affirms to do so from common inflammation only, the pustule on the cornea, not appearing till the eruption is on the decline, and therefore not being a primary or essential feature of the disease. I have never seen a primary variolous pustule on the cornea, nor on any part of the conjunctiva. Dr W. Brown informs me, that, along with the primary eruption, he once saw a pustule on the inside of the lower lid. It is probable, therefore, that there are occasionally pustules on the rest of the conjunctiva and even on the cornea. The opinion of Dr Gregory has been supported by Mr Marson,[3] whose position, as surgeon to the Small-pox Hospital in London, has afforded him opportunities for investigating the point in question. Mr Marson has never seen a small-pox pustule on the eye. The eye appears to him to possess complete immunity from the primary eruption. He considers the destructive inflammation of the eye which follows small-pox as entirely a secondary affection, and as analogous to the sloughing of the cellular membrane, in other parts of the body, which is a frequent sequela of the disease.

Treatment. The best general treatment of small-pox must be followed; a moderate temperature, tepid ablution, and a cool regimen. Emetics are occasionally useful; even blood-letting may be cautiously employed in some cases, and laxatives are always to be administered. If the eyes are particularly affected, they must be frequently bathed with tepid water or poppy decoction, and the edges of the lids smeared with a little cold cream. In many cases, the lids are so much swoln, and so completely sealed up, that it would be in vain to attempt any application to the conjunctiva, till the eruption begins to fade and the swelling to fall. Leeches may be applied, not only without impropriety, but with decided advantage, behind the ears or on the temples, and followed, if it appear necessary, by blisters. Perhaps we might prevent the eyes from becoming much affected, by applying leeches behind the ears. Two or three leeches being allowed to hang till they fall off, two or three others are to be applied, and so on, till a considerable quantity of blood has been abstracted. This is likely to reduce the irritation about the face, and to save the eyes. About the 8th or 9th day of the eruption, free purging will be found useful, not merely in reducing the suppurative fever, but in relieving the uneasy and inflamed state of the eyes. The lids now begin to be opened, so that a little fluid can be injected between them and the eyeball. A

weak solution of nitras argenti, or diluted vinum opii, may be used for this purpose.

As for the treatment of secondary variolous ophthalmia, I have found tartar emetic, given so as to vomit and purge freely, to be productive of the best effects, evidently abating the inflammation, and promoting the absorption of any pustule or onyx which may have formed. Leeches and blisters are also useful. As soon as the inflammation is somewhat abated by these means, advantage will be gained by putting the patient on a course of sulphate of quina. In cases of chronic ulcer, mercury acts very beneficially. Undiluted vinum opii appears to answer best as a local application. The eye is to be touched with it once a-day. Belladonna is to be applied to the eyebrow, in order to keep the pupil dilated.

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[1] See case of two sisters, Mémoires de l'Académie Royale de Chirurgie, Tome xiii. p. 281 ; 12mo ; Paris, 1774.

[2] London Medical Gazette ; Vol. v. p. 222 ; London, 1830.

[3] Ibid. Vol. xxiv. p. 204 ; London, 1839.

SECTION XIII.—ERYSIPELATOUS OPHTHALMIA.

Idiopathic erysipelatous conjunctivitis is a rare disease. It is easily discriminated from any other form of conjunctival inflammation.

Symptoms. It commences with a slight feeling of tension in the eye, and parts immediately surrounding it. The conjunctiva becomes of a pale red colour ; and rises in soft, yellowish-red vesicles round the cornea. These take a different form from every motion of the eyelids, and are sometimes so large as to project from between their edges. On strained or rapid motion of the eyeball, or eyelids, the patient feels a pricking pain in the eye. When the eyelids are a little open, the vesicles give the patient the appearance of one who is weeping, and we expect that every moment the tears will drop from his eye; but on a nearer inspection, and on pressing down the lower eyelid, we discover the mistake, into which we are the more ready to fall, as during this inflammation there frequently is a discharge of tears, especially on sudden changes of temperature. The eye is somewhat impatient of light. No other diseased appearances are observed in the eye itself; and the eyelids may be entirely free from redness or swelling. At the end of the acute stage, the pain of the whole eye is increased, still exciting in the mind of the patient the comparison of pressing or stretching, especially on moving the eye or eyelids.

As the disease continues, the redness of the conjunctiva increases. It becomes indeed so generally red, that we discover no longer a mere network of blood-vessels, but a general, yet pale, and some-

times livid redness. Yet this pale red colour is not uniform. It is contrasted with spots of different sizes, of a bright red colour, which rise from extravasation of blood into the cellular substance between the conjunctiva and sclerotica. The vesicles become more considerable and project still more from between the half-opened eyelids. The spaces between the vesicles are covered with a thin white mucus, which is secreted in unnatural quantity by the conjunctiva and Meibomian glands. The discharge of tears is also increased. During the night the eyelids are glued slightly together, so that it is with some difficulty that the patient opens them in the morning; when they are opened, the cornea appears somewhat dim; but when the eye has been carefully cleared, we see that the apparent dimness of the cornea rises entirely from the mucus collected on its surface.

As the disease begins to subside, the secretion of mucus returns to its natural quantity, the redness of the conjunctiva gradually disappears, and those portions of that membrane which had been elevated in vesicles, re-approach and re-attach themselves to the tunica albuginea and sclerotica. The discharge of tears ceases to be so frequent and so abundant. The spots which arose from the extravasation of blood are the last symptom to disappear. They become of a yellowish-red colour. There continues, even for a long time, such a diminution of the connexion between the conjunctiva and sclerotica at these places, that the conjunctiva falls into wrinkles whenever the eyeball is moved. It is long before it recovers completely its natural pliancy and pellucidness.

Causes. This disease arises from sudden changes of atmosphere, slight blows, the stings of insects, and various other causes.

Treatment. Much depletion is not necessary. The exhibition of a purgative, the opening of the vesicles with the point of a lancet, and the excitation of the cutaneous system by gentle diaphoretics, will in most cases constitute the whole of the necessary means of cure.

Case 219.—Mary Macdonald, aged 20, was admitted at the Glasgow Eye Infirmary, on the 1st March 1832, eight days before which she had rigors, followed by headach and erysipelatous inflammation of the conjunctiva, without any affection of the integuments. The conjunctivæ were of a pale red colour, and on one side the membrane hung in soft masses from between the eyelids. The tongue was white, and the patient complained of thirst. She had applied leeches to the temples, and taken a dose of sulphate of magnesia. She was inclined to attribute the affection of her eyes to exposure to the emanation from a solution of chloride of lime. She was ordered 1 grain of muriate of mercury in 8 ounces of water, as a collyrium.

On the 2d, the swelling of the conjunctivæ was much abated, and the eyes easier. The four-grain solution of the nitrate of silver was applied to the inflamed surface.

On the 6th, the swelling was gone, and the redness much less. The solution and collyrium were continued.

On the 10th, she was ordered ℈j. of precipitated carbonate of iron thrice a-day; and on the 18th, was dismissed cured.

SECTION XIV.—RHEUMATIC OPHTHALMIA.[1]

It has been already stated, that the three inflammatory diseases of the eye, most frequently arising in adults from atmospheric influences, are the catarrhal, the rheumatic, and the catarrho-rheumatic.

Diagnosis. The following particulars will serve sufficiently to distinguish rheumatic from catarrhal ophthalmia.

1. *Seat of the disease.* The catarrhal ophthalmia is an affection of the conjunctiva; the rheumatic has its seat in the albuginea and sclerotica, and frequently extends to the iris.

2. *Redness.* The redness in the catarrhal ophthalmia is reticular, and the turgid vessels are evidently conjunctival; in the rheumatic, the chief redness is radiated or zonular, (*Fig.* 47.) and seated under the conjunctiva, or in the deep-seated conjunctival network. We never see spots of blood extravasated under the conjunctiva in rheumatic ophthalmia; whereas this is a frequent occurrence in catarrhal.

3. *Nature of the inflammation.* The catarrhal ophthalmia is an inflammation of a mucous membrane, and is a blenorrhœal or profluvial disease, attended with an increased and morbid secretion of mucus; the rheumatic attacks the fibrous membranes of the organ of vision, and is unattended by any morbid secretion from the surface of the eye.

4. *Pain.* The pain in the catarrhal ophthalmia arises on the surface of the conjunctiva, is compared to the sensation of roughness, or to the feeling which might be excited by sand or broken glass under the eyelids, does not extend to the head, and is felt most in the morning, or when the eyes begin to be moved; the pain of the eyes in the rheumatic ophthalmia is pulsative and deep-seated, the chief pain, however, is not in the eye, but round the orbit, in the eyebrow, temple, cheek, and side of the nose, and is severely aggravated from sunset till sunrise.

Were I asked, "What is meant by *rheumatic* ophthalmia?" I should answer to the following effect:—

1. By rheumatic ophthalmia, I mean simply inflammation of the fibrous membrane of the eye, (the sclerotica,) and of the surrounding parts of similar structure, excited by exposure to cold.

2. I do not believe this ophthalmia to be an inflammation differing *in kind* from common inflammation, in consequence of the existence of what has been called the rheumatic habit, or diathesis. When atmospheric influence produces catarrh, we never hear the occurrence referred to a mucous diathesis; nor, when pleuritis arises from the same cause do we attribute the disease to a serous diathesis. The same exciting cause, affecting a fibrous instead of a mucous or a serous membrane, produces a new train of symptoms, dependent not on the constitution of the person, but on the structure and functions of the part affected.

3. Rheumatic ophthalmia frequently occurs in individuals who have never suffered from rheumatism in any other part of the body.

4. When rheumatism quits a joint and attacks the heart, which I have known prove fatal, we say it is a metastasis from the former to the latter situation; but such a translation of rheumatic inflammation I have never myself observed in regard to the eye. In all the cases of rheumatic sclerotitis which I have witnessed, the disease was primary, whether in rheumatic or non-rheumatic subjects, never metastatic.

5. I have adopted the term *rheumatic ophthalmia;* but, perhaps, *sclerotitis idiopathica* would be a truer appellation. It must be confessed, however, that this inflammation of the eye resembles rheumatism in its exciting causes, its accompanying pain, its exacerbations, and its cure. It has not been generally recognised as rheumatic, probably because it attacks a structure which is covered only by a thin semitransparent membrane, and therefore exposed to direct examination; while the other seats of rheumatism, unlike this, are hid from our view by the whole thickness of the integuments, and are the subjects, therefore, more of conjecture than of actual observation.

Degree of frequency. The pure rheumatic ophthalmia is comparatively a rare disease. For one case of pure rheumatic, we meet with perhaps ten cases of catarrhal ophthalmia, and six of that mixed kind called catarrho-rheumatic, in which both conjunctiva and sclerotica are affected, and the symptoms of the two former ophthalmiæ are combined. We seldom see both eyes affected with rheumatic ophthalmia at once. When both are attacked, the one is always much more severely inflamed than the other.

Local symptoms. 1. The fasciculi of vessels advance in radii towards the edge, and sometimes even a little over the edge of the cornea. They are of a bright red colour, and surround the cornea pretty equally on all sides. They are larger and more turgid than the radiating vessels seen in iritis, and rise more from the surface of the sclerotica. The conjunctivitis which attends this ophthalmia is slight, and never such as to mask the radiated inflammation of the sclerotica.

2. There is, in general, no tendency to chemosis in the pure rheumatic ophthalmia, nor do the eyelids take part in the disease.

3. Dimness of vision uniformly attends this ophthalmia, depending on an accompanying haziness of the cornea and pupil, attended by a slight contraction of the latter, and sluggishness in the movements of the iris. If only one eye is affected, which, at least for some time, is generally the case, the pupil of that eye is seen at once to be less than that of the sound eye. The iris becomes even slightly discoloured; it becomes greenish, for instance, if naturally blue; and the attending iritis may go on to evident effusion of coagulable lymph within the pupil. It must be understood, however, that a severe degree of iritis rarely attends rheumatic ophthalmia.

4. Except haziness of the cornea and pupil, which may be attributed to slight effusion, it has never happened to me to witness any other of the secondary phenomena of inflammation in pure rheu-

matic ophthalmia. I have not seen the disease terminate in any form of suppuration or of ulceration, both of which are very common in catarrho-rheumatic ophthalmia.

5. The access of light does not in general prove very distressing to the patient. The affected eye feels dry and hot in the early period of the disease; but after a time, especially when the symptoms are somewhat abated by blood-letting, there is a considerable epiphora.

6. The pain which attends rheumatic ophthalmia at its commencement is of a stinging kind, and extends from the eyeball to the orbit, and neighbouring parts of the head. These parts feel hot to the patient, and even to the hand of the observer. The pain is strikingly augmented by warmth. It often affects the forehead, the cheek-bone, and the teeth; extending sometimes even to the lower jaw. Occasionally, it is precisely confined to one half of the head. In some instances it is severe on the side of the nose, or within its cavities, or in the ear. But, above all, the superior margin of the orbit is its chief seat, and next to it the temple and the cheek. Not unfrequently the pain has the acute pulsatory character of phlegmon, especially when felt chiefly in the eyeball; in other cases, and particularly around the orbit, it consists rather in an agonizing kind of feeling, which distresses and wearies out the patience of the person affected. It never ceases entirely, so long as the disease continues; but it varies much in degree, coming on with severity about four, six, or eight o'clock in the evening, continuing during the night, becoming most severe about midnight, and abating towards five or six in the morning; till then totally preventing sleep, and occasioning great distress. The patient never fails, in the history he gives of his case, to insist on the nocturnal pain, and with his finger to point out its supra-ocular or circumorbital seat. It is much more in the forehead, temple, cheek, and side of the nose, than in the eye. It is reasonable to conclude that in this disease the periosteum in and round the orbit, and the fascia of the temporal muscle, structures similar in nature to the sclerotica, are also affected with rheumatism. The chief seat of the pain, however, is in all probability, the branches of the fifth pair of nerves, distributed to the face, and we may fairly attribute a considerable portion of the pain to the sympathy which these nerves have with those distributed to the eyeball.

Constitutional symptoms. A considerable degree of symptomatic fever attends this disease, increasing along with the nocturnal paroxysms of pain. The pulse becomes frequent, and sometimes strong, full, and hard. The tongue is white and furred, and the mouth ill-tasted; there is more or less nausea, and the skin is hot and dry. The digestive organs are deranged, the appetite impaired, the bowels generally confined, and the excretions morbid.

The progress and severity of the disease vary much in different cases. In some the attack is slight, and soon goes off, without permanently injuring the organ. At other times, it is extremely severe,

and, if misunderstood, may soon destroy vision. Not unfrequently the disease falls into a chronic state, without being very severe.

Exciting causes. Rheumatic ophthalmia may be distinctly traced, in most instances, to exposure of the eye to a continued blast of cold air, while the head and face are in a state of perspiration. The patient, in the history which he gives of his case, commonly mentions some particular exposure of this sort, soon after which the redness and rheumatic pain commenced; for example, sleeping with the head exposed to the air entering by a chink in the wall, or by a broken pane of glass; travelling during the night, in a carriage, with one side of the head close to a broken window; suddenly issuing from a crowded room into the cold air of the street; exposure to the blast which blows from the stage into the body of a theatre; keeping wet clothes on the head when over-heated; and the like.

I have not observed that this disease is much more apt to occur at one season of the year than another. It is certainly more prevalent when the wind is cold and north-easterly. It is much more apt to attack persons of middle age than either the young or the old. Indeed, I have never seen it in children, nor in those far advanced in life. Probably the same exciting causes which, in persons of middle-life and robust constitution, are apt to produce rheumatic ophthalmia, would in a child excite catarrhal or scrofulous ophthalmia, and in an old person the catarrho-rheumatic or arthritic. Rheumatic ophthalmia is very apt to re-attack an individual who has previously suffered from it.

Treatment. 1. *Blood-letting.* In all cases of rheumatic ophthalmia, it is necessary to take away blood from the arm, and in general, to follow this up by the application of leeches to the forehead and temple. I feel myself obliged wholly to differ from Mr Wardrop's opinion, that patients affected with rheumatic ophthalmia neither bear bleeding to a great extent, nor are much relieved by this remedy. He has even stated the little relief afforded by bleeding in this disease as one of its diagnostic characters.[2] This entirely disagrees with my experience; and is, I apprehend, altogether contrary to what we observe in other rheumatic affections. Bleeding, both general and local, I have uniformly found extremely useful in rheumatic ophthalmia, and I believe it ought seldom, if ever, to be omitted. The blood drawn is generally very buffy. The first night after taking from 15 to 20 ounces from the arm, the patient is often so much relieved as to get some sleep, even though no other remedy be employed. Next day, I am in the habit of applying a dozen of leeches around the eye; but, if the pulse be still strong and full, and the circumorbital pain not relieved, I first repeat the venesection, and I have had cases under my care which required venesection to be repeated five or six times, before the severe circumorbital pain and other acute symptoms subsided in any considerable degree.

2. *Calomel and opium.* I have never failed to find this combination highly useful in checking the circumorbital pain, and dissipat-

ing the other symptoms. Two pills, each containing 2 grains of calomel, with half a grain of opium, are to be administered every evening till the gums begin to be affected, when the calomel may be omitted, and 10 grains of Dover's powder substituted for the opium. In some cases more frequent doses of calomel and opium may be proper. Mr Wardrop states that mercury, given in this disease so as to produce ptyalism, aggravates more than mitigates the symptoms. This does not correspond with what I have observed. I do not, indeed, push the mercury in order to make the mouth sore, but I have not witnessed any bad effects from the gums becoming affected.

3. *Opiate frictions.* The patient experiences great relief from carefully rubbing the forehead and temple with warm laudanum, or with extract of belladonna infused in laudanum. This ought to be done about an hour before the nocturnal paroxysm is expected, which it will greatly lessen, and sometimes entirely prevent. In chronic cases, equal parts of laudanum and tincture of cantharides form a useful liniment.

4. *Blisters* behind the ear, and to the temple, but above all a large blister to the nape of the neck, will be found useful.

5. *Belladonna.* During the whole course of rheumatic ophthalmia, the pupil of the affected eye ought to be kept under the influence of belladonna, either by smearing the moistened extract upon the eyebrow and eyelids every evening at bedtime, or by infusing 1 drachm of the extract in each ounce of the laudanum which is used for rubbing the head.

6. *Purgatives.* A smart dose of laxative medicine ought to be administered at the commencement of the treatment. Afterwards, a laxative clyster every morning, or a small dose of Epsom salts may be employed, to obviate the constipating effects of the opium. More powerful purgatives are now improper, as they would carry off the calomel and opium, and thereby prevent their good effects.

7. *Sudorifics.* The warm pediluvium at bedtime, with diluent drinks towards evening, operating along with the opium, will, in general, excite a sufficient degree of diaphoresis. Mr Wardrop recommends antimonial powder, and Beer employed guaiac, for exciting the skin in this disease.

8. *Tonics.* Small doses of sulphate of quina, or of the mineral acids, will be found advantageous in the chronic stage of the disease, and during convalescence. In old mistreated cases, Fowler's solution sometimes gives great relief, in doses of from 8 to 12 drops thrice a-day.

9. *Vinum opii.* Applications to the eye itself have but little power over this disease. Those which are so useful in other ophthalmiæ, are often hurtful in the rheumatic. The lunar caustic solution, for instance, which may be regarded as a specific in catarrhal ophthalmia, is in the present disease decidedly injurious. When all the febrile and painful symptoms, however, are gone, and little more than lingering redness, with weakness of the eye, remains, the vinum

opii, in a diluted state, will be found beneficial, dropped upon the eye twice or thrice, or the pure vinum opii, once, daily.

The first, second, third, and fifth of these remedies are to be had recourse to in the first instance. I have never found them fail in any acute case, however severe; nor have I witnessed any permanent sequelæ, when the plan of treatment now explained was adopted with the necessary vigour.

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[1] *Sclerotitis rheumatica vel idiopathica.*
[2] Medico-Chirurgical Transactions; Vol. x. p. 13; London, 1813.

SECTION XV.—CATARRHO-RHEUMATIC OPHTHALMIA.

This compound ophthalmia is one of the most common and also one of the most severe and dangerous diseases of the eye. In old persons especially, it is often the source of permanently diminished vision, and not unfrequently of entire loss of sight in the eye attacked.

Symptoms. 1. As both the conjunctiva and the sclerotica are affected, the symptoms are more complicated, and also more various, than those of unmixed conjunctivitis or sclerotitis.

2. The feeling of roughness or of sand between the eyelids and eyeball, and the secretion of puriform mucus, are sufficiently indicative of the part taken in this disease by the conjunctiva. The nocturnal accession of racking circumorbital pain marks the affection of the sclerotica.

3. In some cases of catarrho-rheumatic ophthalmia, the conjunctivitis is severe, the sclerotitis slight; but more frequently the sclerotitis is severe, and the conjunctivitis not so considerable.

4. In this disease, the conjunctiva and sclerotica are attacked simultaneously. Occasionally it happens in the course of pure rheumatic ophthalmia, that the patient, from some new exposure, becomes affected also with catarrhal conjunctivitis; more rarely does an attack of rheumatic sclerotitis supervene in catarrhal ophthalmia. But in catarrho-rheumatic ophthalmia, both membranes appear to be attacked at once, in consequence of the influence of one and the same exciting cause.

5. The redness is evidently both conjunctival and sclerotic. Under the moveable network of the conjunctiva, we perceive the immovable zonular inflammation of the sclerotica. In pure catarrhal ophthalmia, the sclerotica, no doubt, participates in the inflammation, but no paroxysms of rheumatic pain are present; the sclerotica suffers sympathetically, not primarily. In pure rheumatic ophthalmia, also, the conjunctiva is reddened, from contiguous sympathy with the structure which it covers, just as the skin is reddened over a joint suffering from acute rheumatism; but neither the

conjunctiva in the one instance, nor the skin in the other, is the seat of the primary disease. Besides, in pure rheumatic ophthalmia, the conjunctiva betrays no marks of profluvial disease.

6. Chemosis, or inflammatory œdema of the subconjunctival cellular membrane, is by no means an uncommon attendant on catarrho-rheumatic ophthalmia. When it does occur, it hides from view the sclerotic redness.

7. The discharge from the conjunctiva in this disease is never profuse, and seldom opaque. It amounts, in general, rather to a mere increase of mucus, than to a flow of pus, and renders the lids more than usually moist and slippery.

8. The eyelids adhere together in the morning, from the inspissated mucus and Meibomian secretion. Not unfrequently the lids are also externally red and swoln.

9. Considerable intolerance of light and epiphora attend this ophthalmia in all its stages; but especially in those cases in which the structure of the cornea is affected.

10. The conjunctival pain, which is compared to the feeling produced by sand between the eyelids and eyeball, is felt most in the morning, or when the eyelids are moved. The sclerotic pain is nocturnal, and observes the same periods of renewal, violence, and abatement, as in rheumatic ophthalmia. The conjunctival pain is referred to the surface of the eye, and sometimes to the forehead. The sclerotic pain is either immediately under the eyebrow, or circumorbital.

11. In this disease, the cornea is extremely apt to suffer from ulceration, and from effusion of pus between its lamellæ. Indeed, there is no ophthalmia to which adults are exposed, in which ulcer of the cornea and onyx are so frequent as in the catarrho-rheumatic. If this disease is neglected for eight or ten days, and especially if the patient be far advanced in life, we almost uniformly meet with one or other, and not unfrequently with both, of these symptoms.

12. The ulcer is generally peculiar, in so far as it is apt to spread over the surface, and rarely penetrates deeply into the substance of the cornea. It seems the result of exfoliation of a considerable portion of the corneal conjunctiva. I have seen such a portion loose and raised up apparently by the intervention of a fluid. It must be this appearance which Beer describes as a phlyctenula; but it is more extensive than a phlyctenula, and is neither so circular nor so circumscribed. The ulcer which ensues from the detachment of the corneal covering, often cicatrizes without leaving any opaque speck, the cornea remaining merely irregular, as if part of it had been hacked off with the lancet; and of course vision, from imperfect refraction, is indistinct. Professor Beer and Mr Wardrop have described this kind of ulcer as attendant on pure rheumatic ophthalmia, but I have never seen it except in catarrho-rheumatic cases. If the case continues to be neglected, or if it be mistreated, the ulcer ceases to be superficial, the substance of the cornea is more deeply attacked, and a leucoma will be the result.

13. Onyx, or effusion of pus between the lamellæ, or into the cellular texture of the cornea, is the most alarming of all the symptoms of this ophthalmia. It generally commences at the lower edge of the cornea, in shape like the white spot at the root of the nails, its upper edge presenting a convexity. It gradually increases, mounting upwards, separating more and more the lamellæ between which it is effused, and greatly adding to the sufferings of the patient. It reaches not unfrequently to such a height as to implicate more than half of the cornea. The pus of an onyx in catarrho-rheumatic ophthalmia is very rarely absorbed. The cornea becomes ulcerated over the centre of the onyx; the pus is evacuated; too often the ulcer penetrates through the posterior lamellæ of the cornea; the aqueous humour escapes; the iris falls forward into contact with the ulcerated cornea; in nine cases out of ten these parts adhere together, and if much of the cornea has been destroyed, the result may be partial or total staphyloma.

14. At the same time that the onyx goes on advancing, the colour of the iris changes, and there is commonly an effusion of lymph into the pupil, which becomes, first of all, less vivid in its motions, then hazy and contracted, and at last perhaps obliterated.

15. In some cases, the onyx is accompanied by hypopium or effusion of pus into the anterior chamber, or we may have hypopium without onyx. In other cases an onyx bursts into the anterior chamber; false hypopium is thus produced, and ultimately the cornea gives way.

16. If fortunately the matter of an onyx be absorbed, albugo remains for a considerable time, but gradually diminishes, and may ultimately almost entirely disappear. If the onyx is dispersed by the cornea giving way, leucoma is the result and never entirely disappears. Staphyloma cannot result, unless the cornea has been more or less destroyed by ulceration, and the iris has become partially or totally adherent to the consequent cicatrice. Mr Wardrop has remarked, that partial staphyloma generally affects the inferior half of the cornea.[1] The reason is, that partial staphyloma is commonly the consequence of onyx, which in nine cases out of ten takes place at the lower edge of the cornea.

17. In catarrho-rheumatic ophthalmia, the pulse is generally quick and sharp, the tongue white, and mouth ill-tasted. The nocturnal pain completely prevents sleep, till about sunrise. Catarrh sometimes attends, and adds to the febrile symptoms.

18. We generally find that the rheumatic symptoms yield first to treatment; the catarrhal continuing for some days longer. But in some cases I have observed the reverse; the circumorbital pain continuing, at least in a certain degree, after the catarrhal symptoms were gone.

Causes. The causes of catarrho-rheumatic ophthalmia appear to be similar atmospheric influences to those already enumerated as giving rise to catarrhal, and rheumatic ophthalmiæ. Amongst the

poor, the disease may, in general, be traced to cold, to which the patients have been exposed, particularly during the night, from deficient clothing and want of proper shelter. Like other inflammatory and rheumatic affections, it is more prevalent during the north-easterly winds.

Beer thought that a cold draught of air, (*eine kalte Zugluft*,) playing upon the eye, excited rheumatic ophthalmia; and that foul air (*ein zersetzer verdorbener Lufthreis*) caused catarrhal ophthalmia. According to this view, air at once corrupted and impelled with force against the eye, especially when the head is covered with perspiration, will be the most likely cause of catarrho-rheumatic ophthalmia.

That the discharge from the conjunctiva in catarrho-rheumatic ophthalmia, if applied to the conjunctiva of a healthy eye, will excite a puro-mucous conjunctivitis, is extremely probable. We can be at no loss to distinguish catarrho-rheumatic ophthalmia from that stage of contagious conjunctivitis, in which the inflammation, spreading inwards to the deep-seated textures of the eyeball, excites sympathetic circumorbital pain.

Beer mentions that catarrho-rheumatic ophthalmia sometimes occurs in children, and still more frequently in old persons, along with suppression of urine. But he seems to reject the notion, that this is something more than an accidental coincidence; and gives us no hope that diuretics would be peculiarly serviceable, even though they restored the secretion of urine.[2]

We meet with catarrho-rheumatic ophthalmia much more frequently in old persons than in the young or middle-aged. I have never seen it in children.

Treatment. The successful treatment of this disease does not depend so much on any new remedies, as on a proper selection of some of the means already recommended, either for the catarrhal or for the rheumatic ophthalmia.

1. *Venesection* appears to be as necessary in the catarrho-rheumatic as in the pure rheumatic cases; and is attended by as remarkable relief to all the symptoms, especially to the circumorbital pain. According to the severity of the case, and the age and constitution of the patient, from 10 to 30 ounces of blood may be taken from the arm; and the same quantity on the day following, if the symptoms are not greatly relieved. We must not be deterred from depletion, although we find the patient much weakened and sunk by the pain attending the disease. The abstraction of blood, by removing the pain, and thus affording an opportunity for rest, restores the strength and spirits.

2. *Leeches* to the temple are highly useful, particularly when applied soon after venesection.

3. *Scarification* of the conjunctiva of the eyelids, is to be employed when there is any considerable degree of chemosis.

4. *Calomel and opium* are productive of the same good effects in this ophthalmia as in the pure rheumatic.

5. *Opiate frictions* on the forehead and temple are to be used about an hour before the expected attack of circumorbital pain.

6. *Belladonna* is to be applied, so as to keep the pupil dilated.

7. *Blisters* behind the ear or to the nape of the neck, are to be employed.

8. *Purgatives*, as a brisk dose of calomel and jalap at the beginning, and a gentle laxative every morning during the course of the disease, do good.

9. *Sudorifics*, as the solution of acetate of ammonia, diluent drinks, the warm pediluvium, and a flannel under-dress, will be found useful.

10. *Tonics*, as sulphate of quina and the mineral acids, are to be given on the decline of the disease.

11. *Solution of nitras argenti.* As in the catarrhal, so in the catarrho-rheumatic ophthalmia, the solution of from 4 to 10 grains of nitras argenti in an ounce of distilled water, dropped upon the conjunctiva once a-day, relieves the feeling of sand, and speedily removes the other symptoms of conjunctivitis. This application, however, has no effect on the sclerotic part of the disease. In this ophthalmia, I should consider it a very dangerous mistake to trust almost solely to this remedy, as we often do in pure catarrhal inflammation of the eye, and thus neglect the appropriate means for reducing the attendant inflammation of the sclerotica.

12. *Vinum opii.* Before the catarrhal part of the disease is subdued by the solution of nitrate of silver, vinum opii rather aggravates the symptoms. After the conjunctivitis and the acute sclerotitis have yielded, it operates favourably, as in the chronic stage of the pure rheumatic ophthalmia.

13. The *collyrium muriatis hydrargyri*, 1 grain to 8 ounces, is to be used, tepid, three or four times daily for bathing the eye.

14. The *unguentum præcipitati rubri* is to be smeared along the edges of the eyelids at bedtime. These two remedies are employed as part of the treatment suitable for the conjunctival part of the disease.

15. *Paracentesis corneæ.* With respect to the treatment of onyx, I would not recommend the pus effused between the lamellæ of the cornea to be evacuated by the lancet. In every case in which I have done this, partial or total staphyloma has been the result. When I have left the onyx to itself, the case has sometimes recovered beyond my most sanguine expectations. This I attribute to the natural tendency of the absorbents to remove deposits of matter or lymph, after the inflammation which gave rise to them has ceased, aided by the sorbefacient influence of the calomel over the lymphatic effusion into the pupil, which always attends extensive onyx; to the continued use of belladonna; and to the gradual preparation of the cornea by nature for its giving way, and for its healing up—a preparation which must be entirely defeated when we venture to open the onyx with the knife. Puncturing the cornea, near its edge, so as to evacuate the aqueous humour, is likely to be highly advantageous,

and may be employed when ulcer of the cornea is present, or even when there is an onyx, but the puncture should be made at a distance from the ulcer or abscess, and through a healthy part of the cornea.

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[1] Morbid Anatomy of the Eye; Vol. i. p. 106; London, 1819.
[2] Lehre von den Augenkrankheiten; Vol. i. p. 310; Wien, 1813.

SECTION XVI.—SCROFULOUS CORNEITIS.

The cornea is liable to suffer, more or less directly, in most of the ophthalmiæ already considered. Its superficial layer is apt to become vascular and nebulous in the chronic stage of the puro-mucous ophthalmiæ; it is the seat of phlyctenulæ in scrofulous ophthalmia; and is often extensively destroyed by ulceration, in consequence of injuries and other causes. The spongy or lamellar substance of the cornea, becomes infiltrated with pus, in catarrho-rheumatic ophthalmia; in certain cases, it is perforated layer after layer by ulceration; and is sometimes almost entirely destroyed by suppuration or by sloughing. We have also had occasion to refer to adhesive inflammation of the lining membrane of the cornea. Various inflammations, then, of this part of the eye have already come before us, which we might arrange under the heads, *external*, *parenchymatous*, and *internal*, according to their seats. But the inflammation of the cornea, to which we have now to attend, is specifically different from every other ophthalmia. It is not a puro-mucous affection; and, although occurring only in scrofulous subjects, it is not eruptive. Its development and progress are slow, occupying weeks, months, or years. The conjunctival layer of the cornea, and the substance immediately beneath that layer, are the parts which chiefly appear to be affected in this disease; which, however, may extend to all the tissues of the cornea, and involve the serous membrane of the iris, the crystalline capsule, the sclerotica, the choroid, and even the retina.

Symptoms. 1. The redness is principally in the sclerotica and on the surface of the cornea. The sclerotic redness is in general not very considerable, of a lake colour, the vessels very minute, and arranged in radii round the cornea. Not unfrequently there is a reddish ring, seldom complete, somewhat elevated, formed around or upon the edge of the cornea, while red vessels, more or less numerous, are traceable over its surface to its centre. In some cases the whole cornea is so much covered, that it assumes a red colour, and has been compared, in this state, to a piece of red cloth; a symptom which has therefore been styled *pannus*. This is generally an evident result of merely increased vascularity. In some cases, however, it bears a resemblance to an ecchymosis, till it is examined with a magnifying glass, when the red patch is seen to be made up

of innumerable vessels. In chronic cases, the blood-vessels derived from the recti muscles, and which are visible during health, are much dilated, and spread even over the cornea.

2. The cornea is more or less opaque and rough, and its conjunctival covering thickened and changed in texture. The roughness frequently resembles the dotting which might be produced by touching the surface of the cornea all over with the point of a pin. In other instances, the depressions are somewhat larger, and assume, under the magnifying glass, the appearance of a crowd of minute ulcers. In every case, we find that the surface of the cornea has lost its natural polish; and from this circumstance, even when little opacity is present, the eye appears dull, resembling a glass that has been breathed upon, and vision is indistinct. In some instances, the opacity amounts to haziness only; in others, it consists in a streaked or speckled whiteness, arising from depositions of coagulated lymph, with interstices of clear cornea. Not unfrequently the surface of the cornea becomes completely and almost uniformly white. As the disease subsides, it often presents a greenish hue. Here and there we occasionally observe upon it, elevated points of a yellowish colour, which very rarely suppurate or ulcerate. Once only have I seen deep ulceration in corneitis. It was in a lad who became violently affected with this disease while at sea. The whole cornea was red, of a conical form, and presented at its centre a white sloughy ulcer.

3. In most cases of scrofulous corneitis which have lasted a considerable time, we find the cornea more convex than natural, or even in some degree conical, and the aqueous humour superabundant; or, in other words, there is a degree of *hydropthalmia*. We often observe the whole eyeball to partake in the conical form, with which is generally joined an attenuation of the anterior part of the sclerotica, so that the choroid shines through of a blue colour, an approach to staphyloma of the corpus ciliare. Common staphyloma of the cornea and iris rarely, if ever, results from corneitis. The cornea, from its conical form and its great opacity, sometimes bears a resemblance to such a staphyloma, but, as the symptoms subside, the iris is seen to be unconnected with the cornea.

4. Dilatation of the pupil not unfrequently attends this disease in its pure state, and, in many cases, there is an evident tendency to amaurosis. But in other instances, the inflammation extends along the serous membrane of the iris; and when this is the case, the pupil becomes contracted, and may even, from effusion of coagulable lymph, adhere to the capsule of the lens. In many cases of corneitis, it is difficult to recognise the state of the iris and pupil, through the hazy or speckled cornea. Considerable assistance will be derived, under such circumstances, from concentrating the light upon the surface of the cornea, by means of a double convex lens, and by observing the effect produced by the application of belladonna.

5. There is not, in general, any great degree of intolerance of light in this disease; scrofulous corneitis presenting in this respect

a striking contrast to phlyctenular conjunctivitis. This symptom, however, is variable; for, in some cases, especially in those attended with pannus, the patient cannot bear the light, and there is considerable epiphora.

6. In general there is little or no pain, except perhaps in the commencement of the complaint. It sometimes happens, however, that very acute pain is experienced in the eyeball, coming on in paroxysms; this may be the case, although there is no inflammation of the iris present. After a time, the eye falls into a chronic, indolent state of inflammation, unattended by pain, especially after the whole cornea has become opaque.

7. The pulse is quickened, the patient is restless in the night, and the skin is commonly harsh and dry.

8. The subjects of scrofulous corneitis are, in general, from 8 to 18 years of age; and in the female the complaint frequently appears in connexion with amenorrhœa. In the female as well as in the male, the skin of those affected with corneitis is often coarse and flabby, with the sebaceous follicles of the face much developed, and I have, in many instances, observed it coincident with deafness and a peculiar hoarseness of voice. In one case, I witnessed this disease along with total deafness. The deafness occurred a week or two before the corneitis. Other scrofulous symptoms are generally present, especially swoln lymphatic glands under the jaw, and sometimes nodes on the tibia.

Corneitis appears to be the appropriate name for this disease. The cornea is evidently the chief seat of the morbid changes. They commence apparently in the cornea, and sometimes are almost quite confined to that part. I have seen the opacity of the cornea with scarcely any sclerotic redness.

Causes. The occasional causes of scrofulous corneitis are often obscure. I have known it arise from exposure during the night to the glare of flambeaux, from over-exertion of the eyes, and from want of sleep. In many cases, it is attributable to exposure to cold and wet.

We owe to Gierl and Ammon[1] the observation that opacity of the external lamina of the cornea is often a sympathetic effect of inflammation of the capsule of the aqueous humour. A spot of effused lymph being visible on the internal surface of the cornea, red vessels are by and by seen coursing over its external surface to the corresponding point, and there becoming the source of an opaque deposition.

In one case, which came under my care, in which the pain was excessively severe, the patient recovered perfectly from the corneitis, but died not long after, from scrofulous tubercles at the basis of the brain, pressing on one of the optic nerves.

As it is well known that division of the fifth nerve in brutes produces inflammation, opacity, and ulceration of the cornea, it becomes a question how far corneitis in the human subject may depend on some morbid affection of that nerve. The experiment shows

how inflammation may be brought on by suspending the nervous influence communicated to a part.

Prognosis. Corneitis is always tedious, and often dangerous in its consequences. The amount of recovery, however, is often wonderful, even when little or nothing was expected.

General treatment. 1. *Depletion* may, perhaps, appear to be but seldom indicated, at least by any urgency of pain, or signs of active inflammation. Yet we find considerable advantage from the application of leeches in the neighbourhood of the eye, especially if they are had recourse to early in the disease. When the inflammation affects the proper substance of the cornea, and not its conjunctival covering merely, and the patient cōmplains of pain or tension in the eye or across the forehead, leeches are necessary. If there are violent paroxysms of pain, venesection must be employed. Local bleeding ought to be repeated from time to time; but not so frequently as to reduce much the general strength.

2. *Emetics* and *purgatives* are also useful. They are to be employed according to the directions laid down at pages 421 and 422.

3. *Tartar emetic*, as a sedative and alterative, I have found decidedly advantageous, both by itself in doses of from the 12th to the 4th of a grain thrice a-day, and along with Peruvian bark, or sulphate of quina. This combination is no doubt unchemical, but I have certainly derived more benefit from these two medicines given together, than from either of them singly.

4. *Diaphoretics* are indicated by the dry and harsh state of the skin. Tartar emetic will operate favourably on the skin, and may be assisted by the warm pediluvium, and a dose of Dover's powder, at bedtime.

5. *Mercury*, carried to such a length as to affect the mouth, is of great service in the treatment of this disease. When there are severe paroxysms of pain, calomel and opium should be rapidly thrown in; else the pupil may contract morbid adhesions. In general, mercury is not to be commenced, till the acute symptoms have been removed by depletion of different kinds, and the employment of tartar emetic in small doses. When the mercury begins to act decidedly on the constitution, we generally find that the enlarged vessels on the cornea contract, and the newly deposited matter becomes absorbed. The clearing of the cornea commences around its circumference, the favourable change gradually advancing towards the centre. The best form, in which to administer mercury in this, as in some of the former ophthalmiæ, is calomel with opium. Mercury is peculiarly necessary in those cases which are attended with iritis, and in them ought to be employed from the first.

6. *Sulphate of quina* exercises an influence over scrofulous corneitis, slower of manifestation, but in the end not less beneficial, than that which the same medicine displays in phlyctenular ophthalmia. I have treated many cases with this remedy alone. Violent cases, however, will not yield to it, but require depletion, and mercury.

When we find the patient, on our being called in, affected with great debility, flabbiness of the skin, and night-sweats, it may be proper to put him on sulphate of quina from the first. I have treated many cases with a mixture of calomel and sulphate of quina.

7. *Vegetable alteratives*, as colchicum, sarsaparilla, and elm bark, are useful remedies in scrofulous corneitis, although inferior to cinchona and sulphate of quina. I have witnessed excellent effects from frequent small doses of columbo, rhubarb, and supercarbonate of soda, in this disease. Aconite, and belladonna, given internally, prove useful.

8. *Muriate of barytes* is strongly recommended by Ammon. Whatever remedy is selected, it must not be soon abandoned, although slow in producing beneficial effects. Many cases are under treatment for a whole year or even longer, before they perfectly recover.

9. The cure is greatly promoted by pure air and regular exercise.

Local means of cure. 1. *Warm fomentations* with poppy decoction, or with a warm infusion of belladonna leaves or extract, and exposing the eyes to the vapour of hot water and laudanum, give great relief in those cases in which the presence of light proves irritating.

2. *Blisters* and *issues* on the neck, behind the ear, and on the temple, are useful and generally necessary. A tartar emetic eruption is often of great service.

3. *Stimulants.* I have tried many different remedies of this class. They are admissible, only after the symptoms of acute inflammation are subdued. On the whole, most advantage appears to be derived from vinum opii. It is to be used once a-day, after the acute symptoms have subsided. Next to vinum opii, I would place strong red precipitate salve. About the bulk of a split pea is to be introduced daily between the lids and the eyeball, and then carefully rubbed upon the surface of the cornea through the medium of the upper lid. From half a drachm to a drachm of red precipitate, triturated along with an ounce of white sugar into an impalpable powder, and blown into the eye through a quill, is another mode of applying the same substance. The lunar caustic solution, applied in the usual way, and a solution of 4 grains of sulphate of zinc in an ounce of water, injected over the surface of the eye, are attended with good effects. Very evident advantage is sometimes derived from employing, in the course of the 24 hours, more than one of these stimulants; for example, vinum opii in the morning, and red precipitate salve at bedtime.

4. *Belladonna* is to be used, in extract, smeared on the eyebrow and upper eyelid, every evening, for dilating the pupil, when there are either evident symptoms, or even only a suspicion, of inflammation of the iris.

5. *Evacuation of the aqueous humour* appears to be indicated in those cases in which there exists a tendency to hydrophthalmia. Jüngken recommends it highly.[2]

[1] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xiii. p. 114; Berlin, 1829,

[2] Ammon's Zeitschrift für die Ophthalmologie; Vol. ii. p. 154; Dresden, 1832.

SECTION XVII.—IRITIS IN GENERAL.

It is remarkable, that, although the effects of inflammation of the iris were observed by Hippocrates, for the expressions which on one occasion[1] he applies to the pupil, can signify only the state of that opening, when it is filled with lymph, contracted, and irregular from adhesions, and although these and other effects must have been noticed by all succeeding observers, we owe the first distinct description of iritis to a German surgeon of the present century.[2] From the fact that the iris is nourished principally by two arteries, completely distinct from those which belong to the other textures of the eye, we may readily conceive how iritis may exist as independently of inflammation in the other membranes of this organ, as does conjunctivitis, sclerotitis, or corneitis. The iris is supplied with a quantity of red blood large in proportion to its size, it is also abundantly supplied with nerves both of the motive and sensitive class; hence its great liability to inflammation. The danger to be dreaded from iritis depends on the fact, that the inflammation to which the iris is generally subject, is of the adhesive kind, so that in the course of a few days of a neglected or misunderstood attack, the pupil may become irremediably obliterated by an effusion of coagulable lymph. There always attends upon iritis, a degree of sclerotic, and even of conjunctival, inflammation, the anterior hemisphere of the crystalline capsule is in every case more or less affected, and but too often the inflammatory action involves the choroid and retina. Yet, the iris is plainly the focus of the diseased action and the seat of the most striking morbid changes. It is at the pupillary edge of the iris that the disease commences, whence it spreads to the rest of the iris, to the capsule, and it may be, to the choroid and retina, while the sclerotic and conjunctival inflammation which attends it appears to be sympathetic. That the iris is in many, even of the most severe cases, the only part which has permanently suffered, is inferred from the fact, that an artificial pupil is often found to restore vision, in cases where iritis has obliterated the natural pupil, plainly showing that the choroid and retina had been scarcely, if at all, affected.

Symptoms. There are certain symptoms which characterize inflammation of the iris, from whatever cause it proceeds.

1. Zonular sclerotitis; fine hair-like vessels, running in radii towards the edge of the cornea. (*Fig.* 47.)

2. Discoloration of the iris. If naturally blue, it becomes greenish; if dark-coloured, reddish. This is the result of increased

vascularity, or of effusion of lymph into its substance, or on its posterior surface.

3. Contraction, irregularity, and immobility of the pupil.

4. Effusion of coagulable lymph into the pupil and posterior chamber, and occasionally into the anterior.

5. Adhesions of the iris, and especially of its pupillary edge, to the capsule of the lens; in some rare cases, to the cornea.

6. Tubercles, pustules, or small abscesses of the iris.

7. Dimness of sight, and sometimes total blindness.

8. Pain in the eye, and nocturnal circumorbital pain.

In every case of iritis, a sufficient number of these symptoms will be met with, to enable the observer to decide on the seat of the disease which is before him. All of them are by no means invariably present. We sometimes find, for instance, a dilated pupil in iritis, probably from the co-existence of amaurosis; and in some otherwise well-marked cases, there is not the slightest pain in the eye or head. Iritis may also exist in a very marked manner, without any effusion of lymph, morbid adhesions, or tubercles of the iris, these being part of the changes which take place only in the second stage of the disease, and even then not in every case.

Different seats of the disease. When inflammation affects principally the serous covering, which is prolonged over the front of the iris from the cornea, the disease is styled *iritis serosa;* when the proper substance of the iris is affected, it is called *iritis parenchymatosa.*[3] The former is what is generally present in scrofulous and gonorrhœal cases; and the latter in syphilitic.

Causes. Inflammation of the iris arises from various causes. Those best ascertained are the following:—

1. Exposure to atmospheric changes, and especially to transitions from heat to cold, gives rise to rheumatic or idiopathic iritis.

2. Constitutional syphilis, and syphiloid diseases.

3. Gonorrhœa.

4. Scrofulous inflammation of the iris occurs along with corneitis, as a secondary disease; while in some less frequent cases, we meet with a scrofulous iritis which may be regarded as primary.

5. There is a very peculiar iritis, called arthritic by the Germans, who regard it as depending on gout. I consider it as frequently, if not always, connected with that diseased state of constitution, produced by the long-continued operation of poisonous substances on the system, and especially alcohol and tobacco.

6. Injuries, and such wounds as are inflicted in operating for cataract.

7. One of the most dangerous ophthalmiæ, is a sympathetic iritis, occurring in consequence of injuries of the cornea and iris of the opposite eye.

Besides these different varieties of iritis, others have been described, which ought, however, in all likelihood, to be brought under one or other of those just enumerated; as, one from the action of mercury,[4] and another consequent to typhus fever.[5]

Degrees and prognosis. Iritis is met with of very different degrees of severity.[6] In slight and recent cases, complete restoration may be promised; in severe and neglected cases, it is but too often evident that no hope can be held out of our being able to restore the power of vision, or even to save the form of the eye.

1. In what may be termed the *first degree*, the vascularity in front of the sclerotica is often so slight as to be barely perceptible, existing sometimes only in one or more points, or behind the upper eyelid, where it might not be discovered, unless the lid were raised, and a careful examination made of the whole surface of the eyeball. The surface of the iris is dull, and wants its natural lustre; perhaps the annulus minor of the iris is slightly discoloured. The pupil is of medium size, or somewhat smaller than natural; it wants its usual clean sharp edge, and may even be slightly angular or misshapen. It has lost its jet black appearance, is hazy, and its motions are limited and slow. Vision is slightly obscure and confused, so that when the patient is eagerly engaged in business, he closes the affected eye. No severe pain attends this degree of the disease, and there is scarcely any aversion to light. Iritis may exist for many weeks in the state described, especially in scrofulous subjects. By suitable treatment, the disease, in this degree, may be so completely overcome that not the slightest change in the appearance or action of the iris shall remain.

2. Iritis presents itself to our observation much more frequently in what may be called the *second degree*, when the external inflammation of the eye is such as at once to attract notice. Farthest from the cornea, indeed, the sclerotica appears hardly inflamed, the trunks only of the distended blood-vessels being there observable; but on arriving within a few lines of the cornea, these trunks divide into innumerable ramifications, so as to form a complete radiated zone or halo of inflammation. The vessels seem to terminate abruptly, as if sinking through the sclerotica, and never, in this degree of the disease, advance into or over the cornea. The annulus minor, and partially the annulus major of the iris, have become discoloured from the injection of the substance of the membrane with a superabundant quantity of red blood, or perhaps from effusion of lymph into that substance; and this change of colour is apt to be permanent. The anterior surface of the iris, instead of being smooth and shining, and marked by the ciliary nerves, now appears not only dull, but puckered, and the membrane is evidently swoln, particularly near the pupil, which is retracted towards the lens. The pupil is contracted, irregular, motionless, and filled with an effusion of coagulable lymph, which presents an appearance like half-boiled white of egg. Vision is greatly impaired. The intolerance of light and epiphora are considerable. The pain of the eye is pretty constant, and during the night is attended by circumorbital pain. There are present the symptoms of inflammatory fever.

From such a state of the eye, recovery to a certain extent may take place even without any very methodical treatment. By the

use of proper remedies, the inflammation will gradually be subdued, and the effused lymph be absorbed; the contracted pupil will expand, though probably never so completely as to regain its natural size or mobility, and a tolerably fair state of vision will ultimately be recovered. Scarcely ever does the iris resume its natural colour, when the disease has reached the second degree. As the symptoms yield, whitish or greyish threads of organized lymph will become evident, binding at different points the edge of the pupil to the capsule of the lens. These adhesions are capable of being elongated in time, but never disappear entirely, and necessarily impede the functions of the iris. In other cases, the whole of the edge of the pupil is fringed with lymph, firmly connecting it to the capsule, the centre of which may also be left opaque from lymphatic deposition, in which case the patient sees only through the imperfectly transparent ring left between the central opacity of the capsule, and the fringed edge of the pupil. It sometimes happens in this degree of the disease, that the pigmentum nigrum covering the posterior surface of the iris having been glued by lymph to the anterior capsule, the proper substance of the iris, as the inflammation subsides, regains, in a considerable measure, its power, and the pupil is enlarged, while the pigmentum nigrum remains adherent to the capsule, and is seen of a black colour fringing the edge of the pupil, and constituting a variety of what has been called *cataracta pigmentosa*.

3. Iritis, in the *third degree*, presents the following symptoms. The surface of the eye is much more intensely inflamed. The conjunctiva may be so much so, as completely to mask for a time the zonular redness of the sclerotica. Both the annulus minor and major of the iris lose their natural colour. The iris is bolstered forward, in a convex form, so as to approach the cornea, except its pupillary edge, which in many cases continues retracted towards the capsule of the lens. Around its pupillary edge, the iris often presents a rusty colour, while red vessels and spots of blood may sometimes be discovered on its surface, and still more frequently in the lymph which occupies the contracted pupil. On the surface of the iris, generally near its pupillary edge, one or more minute elevations of a reddish-yellow colour make their appearance, which in some cases are merely spots of effused lymph, but in others prove small abscesses. Viewed through a lens of short focus, these tubercles appear as tufts of innumerable red vessels, not unlike in miniature to one of the cotyledons of the injected placenta. Sometimes pus, discharged from these abscesses of the iris, with lymph, and blood, occupy the anterior chamber. The cornea becomes turbid, so as to resemble a piece of glass which has been breathed upon, and in some cases is dotted over with minute brownish spots. Vision is completely, and, in general, permanently lost. Flashes of light in the eye are frequently perceived by the patient, proving that the disorganization has extended to the choroid and retina. There are great intolerance of light, and copious lacrymation. The pain of the eye which attends this third degree of iritis, is in

general constant and excruciating, and combined with severe nocturnal pain in the eyebrow and round the orbit. When the case is attended by severe and unmitigated pain, especially in syphilitic cases, there is reason to dread the most serious changes in the eye, even abscess of the anterior chamber, attenuation of the sclerotica, protrusion of the choroid, and disorganization of the vitreous humour, which, in such cases, is converted into a pulpy opaque substance. Ultimately the eyeball becomes atrophic.

In this third degree of iritis, the prognosis must always be unfavourable, for although it sometimes happens that the result is not so fatal to vision as was perhaps anticipated, especially if a proper mode of treatment is promptly had recourse to, yet it is never the case that any thing near to a perfect recovery of the eye takes place, under circumstances such as those now detailed. The inflammation may no doubt subside, the effused lymph and pus may at length be taken up from the anterior chamber, but the pupil will never become entirely clear, nor regain any considerable degree of motion. Sometimes no vestige of pupil can be distinguished, so much is the iris changed in form and texture. Most frequently the pupil remains contracted to the size of a pin-hole, through which it sometimes happens that beyond all expectation a considerable share of vision is enjoyed. In most cases, however, so complete a closure of the pupil presents an impenetrable bar to the transmission of light; and, in many instances, from the diseased state of the choroid and retina, not even an artificial opening in the iris can restore vision.

The distinction of *acute* and *chronic* iritis, is of considerable importance.[7]

We meet with the acute disease in robust individuals of full habit, where a powerful cause has acted on the organ, and more especially if the case has been neglected at the commencement, or the cause has continued to act. We find bright external redness, great distention of vessels, rapid and general change of colour in the iris, contraction of the pupil, effusion of lymph, dulness of the cornea, loss of sight, agonizing pain of the eye, severe headach, and considerable fever, with restlessness and want of sleep. In a few days vision is irreparably lost.

On the other hand, iritis may arise so imperceptibly, and proceed so slowly to effusion of lymph, to diminution or even loss of sight, that no pain is felt in the part, and scarcely any redness takes place. No alteration is observed by others, and sometimes not even by the patient, who has been known to discover the disease accidentally on shutting the sound eye, and finding the vision of the other gone.

Inflammation more readily extends from the iris to the rest of the organ in acute cases, yet this extension may equally occur when the disease is chronic. The prognosis must be drawn from a combined consideration of the time the affection has lasted, the cause upon which it depends, and the visible effects already produced. Irre-

parable injury to the organ may occur in a few days, when the inflammation is acute. A fortnight, three weeks, or a month, may elapse, when it is of ordinary severity, without any serious mischief; while a still longer duration does not preclude the expectation of recovery in the more chronic form of the complaint.

Sequelæ. Among the most striking effects of iritis, are the changes which the pupil undergoes, and which are often of a permanent kind. *Atresia iridis*, or contraction of the pupil, and *cataracta lymphatica*, or false cataract, are sequelæ of great importance.

The inflammatory symptoms, to whatever degree of violence they may have reached, after an indefinite period begin to abate; in syphilitic cases, however, seldom without atrophy of the eye, in arthritic cases, seldom without total loss of sight. If pus and blood have been effused into the anterior chamber, they are gradually absorbed; if an abscess has formed on the surface of the iris, the shreds of the cyst, which for a time hang floating in the aqueous humour, at length disappear; and the anterior chamber regains its transparency. In many cases, the iris remains permanently expanded, and its motions completely annihilated. Its greater circle may in some measure resume its natural colour, but the lesser continues discoloured. The puckered appearance of the iris remains. The pupil is almost completely closed, and filled up by a greyish membrane. On dissection, false membranes are found radiating from the pupil, behind the iris, and even coating the internal surface of the choroid.[8] The power of vision is, in general, entirely lost. This state is called by Schmidt, *atresia iridis completa.*

The eye is not always left in so unfavourable a condition. Perhaps there has been no abscess, nor any profuse quantity of effused lymph. When the inflammatory symptoms subside, the pupil though remaining small and irregular, is found still to possess some degree of mobility, and it is possible that the natural colour may be considerably restored. The coagulable lymph by which the pupil is occupied, is reduced to the state of a fine pseudo-membrane, opaque in most instances at its centre, but somewhat transparent, and perhaps reticulated towards its edge. The pupillary margin of the iris does not adhere all round to this pseudo-membrane, but only at some points, the rest being free, and hence the pupil is very irregular, especially when artificially dilated. Vision under these circumstances is impaired, not destroyed; and is sometimes greatly improved by the application of belladonna, so as to dilate the pupil, and allow light to penetrate through the clear spaces in the pseudo-membrane. This constitutes *atresia iridis incompleta.*

In a third set of cases, only part of the iris has been affected with inflammation. When this has gone off, a mere thread of opaque matter remains in the otherwise transparent pupil. By this thread, a single point of the margin of the pupil is kept fixed, while every other part is free and moveable. This is termed *atresia iridis partialis.*

Diagnosis. The ophthalmiæ with which iritis is apt to be confounded, are the rheumatic, and catarrho-rheumatic ophthalmiæ,

corneitis, aquo-capsulitis, inflammation of the crystalline capsule, and retinitis.

1. Rheumatic ophthalmia, catarrho-rheumatic ophthalmia, and rheumatic iritis, are three diseases which merge into one another. A degree of iritis almost invariably attends the two former inflammations. Exactly as it is difficult in many cases of catarrho-rheumatic ophthalmia, to say whether the disease affects more the conjunctiva, or the sclerotica, so it is often doubtful whether we should set down some cases of pure internal ophthalmia, which we meet with, as examples of sclerotitis or of iritis.

2. Although there are present in corneitis a sclerotic zone of inflammation, dimness of vision, and supra-orbital pain, as in iritis, still an attentive examination of the state of the cornea itself will easily enable us to distinguish the one from the other. The cornea is generally much more opaque in corneitis than it ever becomes in any case of iritis, the opacity is speckled and streaked in a peculiar manner, and partially covered by the ramifications of red vessels. If through the cornea we observe the pupil moving briskly, according to the various degrees of light to which the eye is exposed, we may conclude that the case is one of pure corneitis; but as has already been mentioned, we meet with cases in which iritis and corneitis are conjoined, and as the cornea is often too dim to permit of the iris itself being distinctly seen, we are obliged to judge of the existence of this combination by the size and mobility of the pupil. If it be contracted and fixed, iritis is undoubtedly present.

3. In inflammation of the lining membrane of the cornea, or aqueous capsule, there is radiated sclerotitis, seldom, however, surrounding the whole cornea, with dull aching pain in the forehead, so that in these respects there is a resemblance to iritis. The opacities on the internal surface of the cornea are very diagnostic of aquo-capsulitis; they are milky spots producing a peculiar mottled appearance, very unlike any of the common specks of the cornea. In some cases, however, of this disease, there takes place an effusion of coagulable lymph, which, mingling with the aqueous humour, may produce an appearance somewhat closer to the symptoms of severe iritis. Indeed, it sometimes happens after the operation of division of the cataract through the cornea, that iritis occurs in conjunction with aquo-capsulitis.

4. The disease most resembling iritis is inflammation of the crystalline capsule, first accurately described by Professor Walther. Partial zonular sclerotitis, discoloured iris, nebulous, contracted, and fixed pupil, and even adhesions between the iris and the capsule, are present in this disease; and yet it appears specifically different from iritis. The pain which attends it is less, the inflammation is generally limited to one spot of the capsule, it is slower in its progress than iritis, and it is much less under the influence of remedies of any kind. It cannot be denied, however, that inflammation of the crystalline capsule is always accompanied by some degree of iritis.

5. Retinitis resembles iritis in the appearance of the external inflammation by which it is attended, and in the closure of the pupil which it speedily produces; but its attack is more sudden, its progress much more rapid, the pain of the head by which it is attended, still more insufferable, while vision and even the perception of light, are destroyed much earlier, and even before the pupil closes.

General cure of iritis. The chief objects to be attended to in the treatment of iritis are—I. To subdue the inflammation. II. To prevent the effusion of coagulable lymph, or to promote its absorption if it is already effused. III. To preserve the pupil entire, or to dilate it, if already contracted. IV. To assuage the attending pain. To fulfil these objects we have recourse to a combination of remedies.

1. *Blood-letting* must in no case be neglected, and when the patient is robust and the inflammation severe, must be vigorously employed. Local bleeding is by no means adequate to remove iritis even of moderate severity. General bleeding must be premised and repeated till the constitutional irritation is abated. In no disease of the eye, is venesection so remarkable for its sudden effects as in iritis. The patient who could not previously discern the face of a person standing before him except as a mere mass, will often exclaim, on opening the eye after venesection, that he sees clearly. I have observed this especially in syphilitic iritis. The blood taken from the arm in iritis is very buffy, especially when the disease is rheumatic or syphilitic. Cupping is not to be trusted to as a substitute for venesection. It is comparatively of no effect. After venesection, leeches may be applied freely round the eye, and repeated every day or every second day, till the inflammation is subdued. Scarification of the conjunctiva is useless, or even hurtful, in iritis.

2. *Purging, &c.* The use of cathartics, diuretics, a spare and cool diet, confinement within doors, rest of the whole body, and exclusion of the light from the eyes, will be found powerful auxiliaries. In many cases, I have noticed mercury to do little good till it purged, or till purgatives were administered.

3. *Antimony*, and other nauseants, prove useful in two ways. They moderate the circulation, and render the system more susceptible of the influence of mercury.

4. *Opiates* are in general imperiously demanded in iritis, by the severity of the nocturnal circumorbital pain, as well as by the distress which the patient experiences in the eye itself.

5. *Mercury* given so as to affect the constitution, is a most valuable remedy in iritis. By subduing the inflammation, it prevents, as was first pointed out by Professor Beer, the effusion of coagulable lymph from the iris, or, if that substance is already effused, powerfully promotes its absorption. The most useful form for administering mercury in iritis is calomel with opium, given in small doses, frequently repeated. Nichet[9] gives from 10 to 20 grains of calomel daily, with or without opium, according to circumstances. He thinks

prompt salivation important. In five days, and sometimes in two days, he obtains this effect.

6. *Turpentine* has been recommended as a remedy, which, taken internally in cases of iritis, displays properties analogous to those of mercury.[10]

7. *Blisters* behind the ears, or to the nape of the neck, are of material use after sufficient abstraction of blood. Previously to this, they do harm.

8. *Belladonna*, in the first degree of iritis, speedily expands the pupil; in the second and third degrees, it has no apparent effect till the inflammation is considerably subdued by blood-letting and the use of mercury. It ought to be employed in every case, and in all stages of the disease. The usual mode of employing it is in extract, smeared on the eyebrow and eyelids morning and evening. As it is during the night that the disease appears to make most progress, and as during sleep there is a natural closure of the pupil, which must favour the permanent contraction which iritis tends to produce, the evening is evidently the most proper time to apply the belladonna,[11] if used only once in the 24 hours. As soon as the inflammation has subsided in any considerable degree, and the fibres of the iris have become somewhat relieved from the effused lymph, the pupil will begin to expand; and even in neglected cases, where the pupil has been allowed to become almost obliterated, the continued use of belladonna for many months is sometimes attended by a gradual dilatation of the pupil, an elongation of the threads that bind it to the capsule, and a corresponding improvement in vision. After the acute inflammation is gone, a filtered aqueous solution may be dropped upon the eye, morning and evening. Applied thus to the conjunctiva, belladonna has more effect than when smeared on the skin, and sometimes breaks through adhesions, when smearing the outside of the eyelids has failed.

I have already referred to an occasional effect of belladonna, which may perhaps appear to some to afford ground for objecting to its use in the acute stage of iritis, namely, its operation on the proper substance of the iris, so as to dilate the pupil, but at the same time to leave the pigmentum nigrum, or uvea, attached to the capsule of the lens, whence it never afterwards appears to separate. That this tearing of the iris from the uvea does occasionally happen from the influence of belladonna, is, I believe, undeniable. It is, however, a rare occurrence; very rare, if proper means are promptly adopted to subdue the inflammation; more apt to occur if the case is trusted, as some have recommended, to mercury, without blood-letting. After taking away blood, I never hesitate to apply belladonna.

Dr Robertson mentions[12] a case in which an extraordinary effect arose from the application of belladonna, for the pupil expanding in consequence of the application of this remedy, became fixed in the dilated state, giving the eye an amaurotic appearance. Dr Robertson thinks it probable that this effect arose from lymph

being effused, and joining together the fibres of the iris, while under the influence of the belladonna.

The above mentioned remedies are suited, more or less, to every kind of iritis; but, of course, peculiar modifications in the treatment will be necessary according to the different causes of the disease, whether these be syphilitic, scrofulous, arthritic, or of whatever other nature, and according to the different symptoms which each species presents in individual cases.

Applications to the eye in iritis are in general useless and even hazardous. At any rate, they are never to be ventured on in the acute stage.

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[1] Prædictionum, Lib. ii. 28.

[2] Schmidt, Ueber Nachstaar und Iritis nach Staaroperationen; Wien, 1801.

[3] Dzondi, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. i. p. 238; Berlin, 1820. Schindler, in Ibid. Vol. xii. p. 180; Berlin, 1828.

[4] Travers on Iritis, in Surgical Essays by Cooper and Travers; Vol. i. p. 66; London, 1818.

[5] Hewson's Observations on the History and Treatment of the Ophthalmia accompanying the Secondary Forms of Lues Venerea, p. 36; London, 1824. Essay on a peculiar Inflammatory Disease of the Eye, by William Wallace; in the Medico-Chirurgical Transactions; Vol. xiv. p. 286; London, 1828.

[6] Essay on Iritis, by the late Geo. C. Monteath, M.D. in Glasgow Medical Journal; Vol. ii. p. 43; Glasgow, 1829.

[7] Lawrence's Lectures in the Lancet; Vol. x. p. 257; London, 1826.

[8] Cloquet, Pathologie Chirurgicale; Pl. x. fig. 15; Paris, 1831.

[9] Gazette Médicale de Paris, 31 Dec. 1836.

[10] Observations on the Efficacy of Turpentine in the Venereal and other deep-seated Inflammation of the Eye; by Hugh Carmichael; Dublin, 1829.

[11] London Medical and Physical Journal; Vol. liv. p. 113; London, 1825.

[12] Edinburgh Medical and Surgical Journal; Vol. xxxii. p. 291; Edinburgh, 1829.

SECTION XVIII.—RHEUMATIC IRITIS.

It has already been mentioned, that attendant on rheumatic and catarrho-rheumatic ophthalmiæ, there is in general, a degree of iritis. There is a third set of cases, arising like these two ophthalmiæ, from exposure to atmospheric changes, in which the iris is all along the part principally affected, and in which the attack is sudden, in this last respect resembling other diseases caused by external influences, and differing from those, which, originating entirely in some constitutional or internal cause, advance slowly and insidiously. Not unfrequently both eyes are simultaneously affected with this disease, and with nearly equal severity. In other cases, only one eye is inflamed, or the one much more severely than the other.

Local symptoms. In rheumatic iritis, changes occur even at the very commencement of the disease, indicative of the peculiar seat

of the inflammation. These changes commence upon the edge of the pupil, whence they extend gradually towards the ciliary circumference of the iris. The pupil is seen to be contracted, the motions of the iris impeded, and the pupillary opening deprived of the bright black colour which it naturally possesses. The colour of the iris is next observed to undergo a change; first, in the lesser circle, which becomes of a dark hue, and afterwards in the greater, which grows green, if it had been greyish or blue, and reddish, if it had been dark-coloured. This change of colour is a never-failing index of the substance of the iris being inflamed, and, as has already been mentioned, is apt to continue after all the other symptoms of iritis have been subdued. As soon as it is observed to have taken place to a considerable degree in the greater circle, the iris swells, and projects towards the cornea, while the pupillary margin, losing its sharply defined edge, seems somewhat thickened, and is turned back towards the capsule of the lens.

The redness accompanying these changes, is by no means considerable, and is at first confined to the sclerotic coat, in which a number of very minute rose-red vessels are seen, running towards the cornea. By and by, the redness increases, and is seen to arise partly from vessels developed in the conjunctiva. The vascularity is greatest round the cornea; towards the folds of the conjunctiva, it fades away.

The patient complains of pain in the eye, in many cases severe and pulsative, and increased on motion of the organ; pain beneath the eyebrow; and circumorbital nocturnal pain, similar to what is met with in rheumatic sclerotitis.

If the disease be not checked, the pupil is observed to lose its circular form, becoming irregular, and at the same time presenting a greyish appearance. Examined through a magnifying glass of short focus, or even by merely concentrating the rays of light upon the pupil through a double-convex lens, this greyish appearance is seen to be produced by a delicate flake of coagulable lymph. Into this, the processes or dentations of the irregular pupillary margin of the iris seem to shoot, and it is afterwards found that at these points, adhesions between the iris and capsule are apt to be established. It is owing to these adhesions, that the patient, whose vision has been all along indistinct, sometimes complains of now being able to see only one side, or part of an object. For a time, there may be only one, or two tags of adhesion, the rest of the pupil being free, so that on applying belladonna this aperture assumes a very irregular form. (*Fig.* 50.) A patient under my care had five tags, so that his pupil had the shape of an oak-leaf. Several or all of such adhesions may break across, under the influence of belladonna, especially when dropped upon the conjunctiva, and assisted by depletion and mercury. *Fig.* 51 shows the effect of one of the two tags, represented in *Fig.* 50, having thus given way.

Fig. 50.

Fig. 51.

In neglected cases, the pupil is often left much contracted, tagged, and angular, with the iris of a greenish or slate colour, and destitute of its healthy striated appearance and natural lustre. In such cases, vision is permanently weakened.

If the disease proceeds unchecked, the effusion of lymph into the pupil increases. It takes place likewise behind the iris, so that adhesions are formed between the uvea and the capsule of the lens. The quantity of lymph effused is sometimes so great, as to fall down in a curd-like form, into the anterior chamber.

By this time, the morbid sensibility to light, which prevailed at the commencement of the disease is diminished; the powers of vision become gradually more and more limited, and at length little more than the perception of light remains. Not unfrequently, the lymph occupying the contracted pupil, gives rise to the sensation of a black spot, like a fly, or of several black or hazy spots, placed as it were at some distance before the eye, and partially intercepting the view of the objects situated before or to one side of the patient.

As the disease proceeds, the cornea loses somewhat of its peculiar brilliancy, and in some cases, very striking changes take place on the anterior surface of the iris. Spots of lymph occasionally form upon it; while, in other cases, lymph appears to be deposited in the substance of the iris, for, while it projects more and more towards the cornea, its fibres get collected into bundles, giving to its surface a peculiar plaited or puckered appearance. In some rare cases, one or more yellowish-red elevations form on the anterior surface of the iris, most frequently about the union of its greater and lesser circles. Small at first, such an elevation gradually enlarges, projects towards the cornea, and is at length distinctly seen to be a cyst containing pus, which, finally bursting, discharges its contents into the anterior chamber, and thus gives rise to spurious hypopium. A small quantity of blood is sometimes extravasated at the same time into that cavity.

Such is the general history of a neglected case of rheumatic iritis. We meet, of course, with many degrees of severity in this disease; while its sequelæ are, as has been described in the last section, varied and more or less detrimental to vision. The inflammation will at length subside, even though no remedies are employed; but, in such cases, vision will in general be lost.

Constitutional symptoms. Like rheumatic sclerotitis, this inflammation of the iris may attack an individual who has never suffered from rheumatism in any other part of the body. Not unfrequently, however, the subjects of this disease have long been subject to other rheumatic affections, although the iritis appears in every case to be excited by some new exposure to cold, and never, as far as I have seen, to be metastatic. Thirst, whiteness of the tongue, and accelerated pulse attend rheumatic iritis. The bowels are frequently confined, and there is occasionally a disposition to nausea.

Causes. These are the same with those already enumerated as producing rheumatic ophthalmia. Some individuals of confirmed

rheumatic habits suffer exceedingly from one or more attacks of this disease every year, each succeeding attack leaving the eye in a worse state, till at length vision is destroyed.

This iritis frequently occurs during, or after the use of mercury, in consequence of this medicine powerfully predisposing the whole body to suffer from the exciting causes of rheumatic inflammation.

Complication with amaurosis. This is a complication by no means of very rare occurrence. It is particularly frequent after typhus fever, a disease, which it is well known, is apt to leave the retina more or less insensible, and the pupil dilated.

Mr Wallace has described[1] the complication of amaurosis with iritis after typhus fever, as presenting two distinct stages. During the first stage, there exist amaurotic symptoms alone; in the second, symptoms of inflammation are superadded. The length of time that the amaurotic symptoms continue before the occurrence of any visible appearance of inflammation, is extremely uncertain, as also the period after fever, at which the amaurotic symptoms commence. On many occasions, the amaurotic symptoms, particularly a slight dimness of vision, with muscæ volitantes, have commenced at or even before the time of convalescence from fever, and yet the inflammatory stage has not supervened for weeks, or even months; while on other occasions the dimness of vision has not commenced for several days, weeks, or even months, after the febrile attack, and has then been immediately followed by the symptoms of inflammation. Mr Wallace never saw a case, in which, upon strict inquiry, amaurotic symptoms had not preceded the inflammatory ones. He also observed that the inflammatory symptoms uniformly subsided before the amaurotic ones disappeared, and often before they had even diminished in severity.

Treatment. 1. *Blood-letting.* The degree of synocha which is present in rheumatic iritis must guide us as to the extent and kind of bleeding. Repeated venesection is almost always necessary, followed by the liberal application of leeches round the eye.

2. *Mercury.* Scarcely is the mouth affected by the use of mercury, when we observe the most marked abatement of the symptoms. Two grains of calomel, with one-third of a grain of opium may be given in acute cases, every six hours, and less frequently in chronic cases, taking care not to make the mouth sore too soon.

It cannot be denied, however, that unless the patient be careful to avoid new exposure to cold, the mercurial treatment may prove actually more injurious than beneficial. He ought to leave off his usual employment, confine himself within doors, and, if the case is severe, keep his bed. Unless this be done, the disease is apt to recur with redoubled fury, even from such slight causes as changing the head-dress, passing from one room to another, and the like. It is sometimes a question of difficulty, when the patient is poor, and unprovided with proper clothing and shelter, whether we should give mercury at all, unless the patient be admitted into an hospital. We are almost certain by its omission to ruin the eye, and by its

exhibition seriously to endanger the general health. The patient's room should be darkened, and have a moderate fire in it in winter. A band of flannel should be constantly worn around the head, and several folds of linen over the eye, to prevent the bad effects of atmospheric changes.

3. *Turpentine*, as recommended by Mr Carmichael, for syphilitic iritis, may be tried with some hope of success. See next section.

4. *Rest*, and *the antiphlogistic regimen*, must be strictly enjoined. The patient must relinquish animal food, and fermented liquors.

5. *Opiates.* If we give calomel, we combine it with opium. If we refrain from the internal use of mercury, a powerful opiate ought to be given every night, to assuage the pain. Friction of the head with warm laudanum, is also to be employed, or friction with mercurial ointment mixed with opium. Should this, along with the opiate taken internally, fail to prevent the nocturnal attack of pain in the eye and round the orbit, considerable relief may be obtained by fomenting the eyelids and parts around with flannel cloths, wrung out of some narcotic decoction, such as that of poppy-heads, tobacco, or belladonna, care being taken to dry the parts well as soon as the fomentation is finished, and then to replace the linen compress, previously heated at the fire.

6. *Purgatives.* As much of the sulphate of magnesia as will open the bowels moderately, is to be given every morning.

7. *Diuretics.* Small doses of nitre and cream of tartar, every two or three hours, are useful.

8. *Diaphoretics* are of service, but are liable to the same objection as mercury. Unless the patient can protect himself from cold, they ought to be avoided.

9. *Cinchona* is undoubtedly a remedy of considerable utility in the treatment of rheumatic iritis. I am as much opposed, however, to the idea of trusting to it almost alone, as I am to the plan of confiding solely in the antiphlogistic and sorbefacient powers of mercury in this disease, to the neglect of blood-letting, and other depletory means of cure. In an inflammation of so dangerous a nature as iritis, we should be ready to avail ourselves of every remedy, and never allow ourselves to be beguiled into bad practice, by an affectation of simplicity.

It is chiefly in the combined cases of amaurosis and iritis after typhus fever, that cinchona has been found useful; and it is upon the iritis, more than upon the amaurosis, that it has been found to exercise its beneficial influence. Notwithstanding the strong testimony of Mr Wallace[2] in favour of commencing the treatment of such cases with cinchona, I confess I am not convinced of the propriety of omitting the use of depletion, and mercury. Certainly the disease will not be aggravated by employing these means. Indeed, the fact is undeniable, that cases of the very same kind as those recorded by Mr Wallace, were cured by mercury under the care of Mr Hewson.[3] After the acute symptoms are subdued by depletion and mercury, I have no doubt that cinchona, in the form

either of bark, or of sulphate of quina, will be found highly useful, not only in the particular variety of iritis which is so apt to follow typhus fever, but in ordinary cases of rheumatic iritis, and especially when the patient is of a scrofulous constitution.

I may here observe that I am inclined to suspect the existence of lingering congestion in the head, in the cases of combined iritis and amaurosis, which succeed to typhus fever. In a case of this kind, little or no effect was produced by repeated leeching, the use of calomel with opium, and the application of belladonna. There was all along slight pain in the eye, with zonular redness, irregular pupil, and dimness of sight. Thirty ounces of blood were taken from the arm. The patient felt immediately easier. The second cupful was observed to be considerably more buffy than the first. Next morning the pupil was widely dilated in consequence of the action of the belladonna, the redness much less, the pain completely gone, and vision greatly improved.

10. *Blisters* behind the ear, on the temple, and on the back of the neck, are of more service in the rheumatic, than in any other kind of iritis. To produce a more moderate degree of counter-irritation, the laudanum with which the head is rubbed, when the nocturnal pain threatens to begin, may be mixed with an equal quantity of tincture of cantharides.

11. *Belladonna* should be freely applied morning and evening to the eyebrow and eyelids. In general, it has little apparent effect, till the inflammation is considerably subdued by bleeding and calomel. It is often used for eight days or more, and little or no dilatation of the pupil is produced, till upon taking away more blood, or the gums becoming touched, the pupil suddenly expands, an event to be hailed as very favourable.

12. *Vinum opii* is serviceable in the decline of this disease. Any application to the eye itself in the form of collyrium, drop, or salve, is worse than useless, in the acute stage.

Prevention. Those who are subject to rheumatic iritis must carefully avoid the exciting causes; especially, sudden transitions from heat to cold, violent exercises, crowded assemblies, late hours, card-playing, excess in eating and drinking, and the like. Sea-bathing in summer is sometimes of use in preventing relapses. Removal to a southern climate during the winter, may be the means of saving a patient from his usual attack.

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[1] Medico-Chirurgical Transactions; Vol. xiv. p. 294; London, 1828.

[2] Ibid. pp. 296, 299.

[3] Hewson's Observations on the History and Treatment of the Ophthalmia accompanying the Secondary Forms of Lues Venerea; p. 109; London, 1824.

SECTION XIX.—SYPHILITIC IRITIS.

Like other secondary syphilitic affections, syphilitic iritis is insidious in its early stage, but after a time rapidly and extensively destructive. If left to itself, it does not fail to disorganize almost every texture of the eyeball, commencing with the iris, and extending its destructive influence to the choroid and retina, the vitreous humour, and even the cornea and sclerotica.

Local symptoms. The general diagnostic symptoms of iritis, as enumerated at page 452, are in general well marked in the syphilitic species; but it is important to observe, that in the incipient stage, they are sometimes very slight, the syphilitic differing in this respect from the rheumatic iritis, which from the external nature and sudden action of its exciting cause, is generally characterized even from the commencement by signs which can scarcely be overlooked or mistaken. In the syphilitic species, on the other hand, the redness is sometimes for a length of time scattered or fascicular rather than zonular, and the changes in the appearance of the iris and pupil very slight. This shows the necessity, in suspected cases, perhaps I ought to say in *all* cases of iritis, of examining with attention the state of the skin and throat, and inquiring into the history of the patient's previous health. We almost always find the remains of a syphilitic eruption, or sore throat, attendant on syphilitic inflammation of the iris; in many cases this ophthalmia is co-existent with active secondary symptoms in various textures of the body; sometimes, though rarely, with primary symptoms; and in all instances, the history of the patient's health will throw a degree of light on the affection of the eye, which may be the means of preventing the most disastrous consequences.

It is unnecessary to repeat any description of the zonular redness, discoloration of the iris, contraction, irregularity, and immobility of the pupil, effusion of lymph, and other general symptoms of iritis, as they occur in the syphilitic species. In none of these symptoms, nor in the dimness of sight, and pain which attend them, is there any thing that I know of, really diagnostic; although some authors have imagined, that they had discovered in certain of these symptoms, peculiarities, upon which a diagnosis could be founded. The fact, however, that even directly contrary appearances have been enumerated as diagnostic of syphilitic iritis, shows, that to distinguish this species from the rheumatic, something more must be taken into account, than any differences which may be observed in the general symptoms of the disease. Perhaps I ought to except a rusty colour of the iris near its pupillary edge, which is certainly observed in syphilitic cases.

Beer has described two remarkable local appearances as characteristic of syphilitic iritis; *viz.* displacement of the pupil, and condylomata sprouting from the iris.

The first of these consists in a gradual movement of the pupil upwards and inwards, so that instead of being placed, as it is in

health, nearly in the centre of the iris, it comes to be situated considerably closer to the upper and inner edge of that membrane. This displacement I have seen in chronic rheumatic iritis; and still more frequently in choroiditis, unattended by iritis. I cannot regard it, then, as diagnostic of syphilitic iritis. That it is occasionally met with in this disease, I have no doubt; but I believe it to be a symptom, not so much of the iritis as of an affection of the ciliary or iridal nerves.

As for the condylomata described by Beer as diagnostic of this disease, I believe them to be tubercles, pustules, or small abscesses, very rarely met with except in syphilitic cases, and generally accompanied or preceded by a syphilitic eruption over the body. On first showing themselves, they are of a reddish-brown colour, somewhat irregular on their surface, growing frequently from the edge of the pupil, assuming by and by a yellowish hue, projecting from the plane of the iris, and enlarging sometimes to such a size as to press the iris backwards, and to fill the anterior chamber. Dr Monteath supposed that they sometimes form on the posterior surface of the iris, pushing it forwards, and forcing a passage between its fibres. At length they burst, and discharge the purulent matter they contain, into the anterior chamber. After this, the cyst, which contained the matter, shrinks; but from the corresponding portion of the edge of the pupil being, I believe, always adherent to the capsule, as the shrinking of the cyst goes on, the ciliary edge of the iris is apt thereby to be separated from the choroid, or its fibres to be lacerated and absorbed, so that either the uvea comes into view, of a black colour, or actually an aperture is formed in the iris, or a false pupil, which never closes.

Tubercles may form at any part of the iris, close to the pupil, to the ciliary edge, or midway between them. When situated at the ciliary edge, they sometimes disappear from the anterior chamber, form a projection of the choroid and sclerotica, behind the cornea, and burst externally. This I never myself observed; but in more than one instance I have seen this disease combined with a hard elevation, of a dark red colour, somewhat like a phlegmon, behind the edge of the cornea, ending in attenuation of the sclerotica and protrusion of the choroid.

As to the question, whether such tubercles occur only in syphilitic cases, I have seen a cyst form on the surface of the iris in rheumatic iritis, but this is a very rare event. The existence of tubercles, therefore, ought immediately to rouse suspicion that the case is syphilitic.

If syphilitic iritis is neglected, not only is the pupil speedily closed, and bound down to the capsule of the lens by effused lymph, but the iris is remarkably changed in its appearance, much more so than in any other species of this disease. The cornea, also, becomes hazy, and sometimes dotted over with minute brown spots. The anterior chamber becomes less in size, from the iris being pushed forwards, and at length from the cornea shrinking in diameter.

The sclerotica, choroid, and retina all partake in the inflammation; the retina becoming insensible to light, while the choroid protrudes, here and there, of a deep bluish colour, through the attenuated sclerotica. The lens and vitreous humour are also disorganized, being converted into a pultaceous mass, which may at last be observed forming whitish projecting points through the choroid and sclerotica. From such a state of disease it is impossible for the eye to recover, so as to preserve its natural form. Neither do we find that puncturing the eye in such a state, affords any relief to the pain which the patient suffers; it is not from any collection of purulent fluid that the appearance above mentioned arises, and nothing is discharged on passing the lancet through the tunics. If the system is brought under the action of mercury, the eye will, under these circumstances, shrink to a small size; but if this is not done, if an insufficient quantity of mercury be given, or that medicine too soon given up, disorganization of the eye may succeed, the sclerotica give way, and a fungous excrescence protrude. At last, from the severity of the pain in the eye and head, the inefficacy of opiates, the fever and debility which are induced, and from the unseemly and disorganized state of the eye, we shall be obliged to remove it with the knife.

The degrees of syphilitic iritis, and its sequelæ, are of course, very various. In some cases it is attended by amaurosis, and then the pupil is enlarged beyond the medium size. Sometimes the pupil is dilated to twice its natural diameter, the centre remaining black, while its edge is surrounded by condylomata. In such cases, though part of the pupil is pretty clear, the patient sees little or none on account of the condition of the retina; yet, from this state, the eye may completely recover, by appropriate treatment. The terminations of the disease, if not counteracted by an early employment of mercury, are generally such as have been described (page 455) under the *third degree;* viz. closure of the pupil, obliteration of the anterior and posterior chambers, and perhaps even general disorganization and sinking of the eyeball. Very differently from what happens in neglected rheumatic iritis, the inflammation in syphilitic iritis does not wear itself out, and end in simple loss of vision by closure of the pupil, but goes on from one texture of the eye to another, till the whole are involved in a process of disorganization, which leaves scarcely a trace of natural structure.

The pain which attends syphilitic iritis is very various in severity. In general, it is considerable both in the eye and round the orbit, attended by lacrymation and photophobia, and, like syphilitic pains in the bones, greatly aggravated during the night.

Constitutional symptoms. This disease is generally accompanied by very evident manifestations of syphilitic cachexia. The pulse is quick, the general strength impaired, the appetite lost, the countenance pale or sallow, and the skin covered, especially during the night, with a clammy perspiration. If syphilitic iritis has been long neglected and attended with severe nocturnal pain, the patient

becomes emaciated and greatly enfeebled. The local secondary symptoms, with which I have most frequently found syphilitic iritis associated, have been pustular, papular, and scaly eruptions on the face and over the body, and next to these, sore throat. The pustules on the face, which I have met with as attendants on syphilitic iritis, have frequently been large, hard, and seated so deeply in the skin, as almost to deserve the name of tubercles. The scaly eruptions on the face have occasionally presented an approach to the areolar form of lepra. Over the body, again, where the eruption has generally been of a more acute character, the appearance has been that of numerous circular elevated spots, of a brownish-red colour, about the size of a split pea, ending in a desquamation of successive thin pellicles of cuticle.

Exciting causes. Although this disease is unquestionably an effect of the contamination of the constitution by syphilis, and although it commences, in many cases, without any known exciting cause, yet it not unfrequently happens, that, like other secondary symptoms of syphilis, and especially sore throat, it is excited by exposure to cold. Slight blows on the eye, and over exertion of the organ, seem in other instances to aid in bringing on this disease, which, therefore, may be regarded, at least in many cases, as an effect of certain external causes operating on a constitution imbued with a morbid poison.

Relapses. Even when syphilitic iritis terminates in the most favourable manner, the eye, for a long time afterwards, is peculiarly sensible to the influence of cold and moisture. On every exposure to these, the sclerotic circle of inflammation may be observed to return, the light is felt to be disagreeable, and the eye discharges a superabundant quantity of tears. For the same reason, the formation of an artificial pupil, when this is required from the effects of syphilitic iritis, is generally followed by such a degree of renewed inflammation, as to frustrate the attempt to restore vision.

Treatment. 1. *Blood-letting* is generally necessary in syphilitic iritis. Dr Monteath's testimony on this point is valuable. "Judging from my own experience," says he,[1] "I differ decidedly from those who put their whole faith in mercury in the cure of this species, to the exclusion of the other remedies, such as bleeding, blistering, &c. In my own practice, I have seen the disease running on with rapid strides to dangerous hypopion, notwithstanding the full action of mercury, and its further progress at once arrested by a full bleeding from the arm, and a blister on the hind-head."

I have been obliged to bleed repeatedly at the arm, besides applying leeches, before the symptoms yielded sufficiently to permit of much benefit being derived from the mercury which was employed.

2. *Regimen.* The patient must abstain from animal food and fermented liquors.

3. *Opiate frictions* round the orbit are carefully to be employed about an hour before the nightly attack of pain is expected; after which, the eye is to be covered with a fold of linen, warmed at the

fire. Whenever the pain threatens to recur (and it is particularly apt to do so about midnight), the opiate friction ought to be repeated. Laudanum, an infusion of extract of belladonna in laudanum, a mixture of laudanum with tincture of cantharides, moistened opium, opiate mercurial ointment, or tincture of tobacco, will be selected for this purpose, according to the circumstances of the case, and the opinion of the practitioner.

4. *Mercury.* Upon this medicine we place our chief reliance for arresting syphilitic inflammation of the iris, and removing the morbid changes which may have already been produced in that membrane, and in the pupil. It is not an alterative course of mercury, however, which is to be employed. The constitution must be thoroughly mercurialized, and the mouth made distinctly sore. In many cases, I have known little effect produced till pretty profuse salivation was established. I remember one case in which mercury had been tried, and laid aside as ineffectual, by the family-doctor: even after it was recommenced, it produced but very slight benefit, until the patient, having taken 10 grains of calomel, with 5 of opium, daily, for several days continuedly, the mouth suddenly became sore, and the iritis went off as by a charm. It was a very decided syphilitic case, the body being covered by a copper-coloured eruption.

The combination of calomel with opium, is the best form for exhibiting mercury in this disease. A pill, containing 2 grains of the former, with from a quarter of a grain to a whole grain of the latter, may be given morning, noon, and night, till the gums are decidedly affected; after which, two pills daily may be continued for some time; and when the mercurialization is more advanced, one at bedtime only. This is the plan to be followed in severe cases, where it is important instantly to arrest the progress of the disease, prevent deposition of lymph into the pupil, or procure its absorption, if already effused. In milder cases, we may trust to a pill morning and evening from the beginning.

Other forms of mercury have been employed in the cure of this disease, especially inunction round the eye, and corrosive sublimate taken internally. But neither of these can be relied on when the symptoms are urgent, and in all circumstances they are greatly inferior to calomel and opium, the soothing and dirigent effects of the opium being of no small importance.

Mercury, in one form or other, will require to be continued for a considerable length of time, that not only the iritis may be arrested, and its effects removed, as far as this is practicable, but that the constitutional syphilis also may be completely cured. A removal of the iritis must not be depended on as a proof of the constitution being freed of the syphilitic virus; while, on the other hand, a removal of the constitutional disease, in many cases, is or appears to be effected, although there remains much to be done, and that chiefly by the operation of mercury, before the eye is freed from the iritis and its consequences.

5. *Turpentine* has been recommended by Mr Hugh Carmichael, of Dublin, in syphilitic iritis and other deep-seated inflammations of the eye. The cases which he has related in his pamphlet, afford indubitable evidence that this medicine has occasionally removed that species of iritis which is considered as syphilitic; and even after lymph has been effused into the pupil, and condylomata have risen on the surface of the iris, has restored these parts to their perfectly healthy state. It was from the acknowledged influence of turpentine in peritonitis, and the analogy in point of morbid effects between inflammation of the peritoneum and that of the iris, in both cases a serous membrane being engaged, and in both adhesions being produced between the surfaces intended to be free, that Mr C. was led to make use of turpentine in iritis. The results were such as to confirm the idea he had formed. As it is in syphilitic cases chiefly that he has found turpentine useful, he is well aware of the objection likely to be started by some, that this medicine has never been known to possess any anti-syphilitic virtues. To this, he might have effectively replied, by an appeal to the non-mercurial treatment of syphilis, and to the overpowering testimony of the facts which he himself has recorded. He seems at first disposed, however, rather to chime in with the scepticism of Mr Travers, who is at a loss to determine whether what is generally considered as syphilitic iritis, is actually a venereal inflammation, or a symptom which merely resembles syphilis, or a disease ingrafted on the syphilitic, or an effect produced by the poison of mercury. But in a more advanced part of his inquiry, Mr C. declares in favour of the doctrine, that mercury operates in the favourable manner in which it is universally acknowledged to do in syphilitic iritis, not so much by means of any peculiar anti-syphilitic property which it possesses, as in consequence of its power to excite the action of the absorbents; and this same sorbefacient power he claims for the oil of turpentine. This claim is abundantly vindicated by the cases which Mr C. has related; and not only so, but he has also demonstrated that this medicine possesses a controlling power over the inflammatory process, upon which the effusion of lymph, in syphilitic iritis, depends.

Although Mr Carmichael has the merit of having brought forward a new medicine in syphilitic iritis, of unquestionable utility, he is by no means blind to the virtues of other remedies. He acknowledges, that the same antiphlogistic and sorbefacient effects which he has derived from turpentine, may be produced in a more decided manner, by mercury; while he very properly urges, that the rapidity with which turpentine pervades the body, and consequently brings disease under its influence, together with the absence of fever during its operation on the constitution, must render its use a matter of interest and utility, though the same effects might be accomplished by other means, and even in a more decided manner. Cases of syphilitic iritis occasionally occur, where, from a variety of circumstances, the administration of mercury is, for the time, altogether

inadmissible, or at least, extremely hazardous. How fortunate then will it be, if an efficient substitute for mercury be found in the medicine proposed by Mr Carmichael!

The dose of oil of turpentine is a drachm thrice a-day. Its disagreeable flavour, and nauseating effects, may be obviated by giving it in the form of emulsion. If it induces strangury, lint-seed tea and camphor julep may be administered, or its use suspended for a time. The tendency to heartburn, which it sometimes causes, may be prevented by an addition of 10 or 15 grains of carbonate of soda to the 8 ounce emulsion, containing an ounce of turpentine.

When the local inflammation is high, and acute pain is present in the eye and side of the head, abstraction of blood ought by no means to be neglected, notwithstanding the statement of Mr C. that he has frequently, even when these symptoms were urgent, relied solely on the turpentine mixture, and reaped from it the most decided and expeditious benefit. The condition of the bowels will also require attention; the beneficial effects of the turpentine appearing to be suspended when constipation is present, and again called forth when this is removed. Perfect rest, too, if not absolutely necessary, will be found highly conducive to the complete production of the salutary effects of the turpentine. Mr C. states, that in a few patients, who, from their particular situations in life, were obliged to continue in active employment, the same satisfactory results did not follow its exhibition, nor was its influence fully established, until this was attended to.

In some of the cases given by Mr C. sedatives were employed along with turpentine; such as opium, henbane, and cicuta. These may be exhibited, both internally and externally; and, of course, the application of belladonna ought not to be omitted.

Mr C. states, that the administration of turpentine has very seldom failed in effecting a perfect cure of syphilitic iritis, and that an amendment has generally been quite perceptible the day after it commenced. The average period of cure seems, in his hands, to have been about 11 days.

Other practitioners have not reported so favourably of this remedy. Mr Guthrie states[2] that "in some cases it has succeeded admirably; in others it has been of little service; and in some, unequal to the cure of the complaint." Mr Foote junior[3] is inclined "to think, that turpentine acts by exciting irritation in the intestinal canal and urinary apparatus." He states, that the cases which had been most successful under his observation, were those in which severe strangury was excited. When it was found impossible to produce this kind of irritation, no benefit was experienced.

6. *Belladonna* is to be smeared liberally on the eyebrow and eyelids, every night at bedtime; and when the acute symptoms have subsided, a filtered aqueous solution of it may be dropped several times a-day upon the conjunctiva. This remedy ought to be continued regularly for months, unless the pupil has completely regained its natural freedom and mobility.

7. *Nauseants, sudorifics, diuretics, purgatives*, and *counter-irritation by blisters*, have each their use in syphilitic iritis. Blisters prove highly serviceable after depletion, and after the gums are touched by mercury.

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[1] Glasgow Medical Journal; Vol. ii. p. 59; Glasgow, 1829.
[2] London Medical Gazette; Vol. iv. p. 509; London, 1829.
[3] London Medical and Surgical Journal for September 1831, p. 229.

SECTION XX.—PSEUDO-SYPHILITIC IRITIS.

It is generally admitted that there are various diseases, either communicated by impure venereal intercourse or arising in the system without any communication of that sort, which present a series of morbid phenomena, milder and more rapid in general, but still, in many respects, similar to those of syphilis. Till a more accurate description of the diseases in question be obtained, we may be allowed to speak of them as *syphiloid* or *pseudo-syphilitic*.

The pustular eruption spoken of by Bateman, under the name of *ecthyma cachecticum*, appears to be one of the disorders apt to be confounded with true syphilis; and there is no doubt that it occasionally affects the iris, in a manner closely resembling the iritis we have just been considering.

This disease occurs, Dr Bateman tells us, in connexion with a state of cachexia, apparently indicative of the operation of a morbid poison. It much resembles some of the secondary symptoms of syphilis, and is often treated as syphilitic, although there can be no doubt that it originates frequently, if not always, from derangement of the general health, independent of any thing like infection.

It generally commences with a febrile paroxysm, which is sometimes considerable. In the course of two or three days, numerous scattered pustules appear, with a hard inflamed base, on the breast and extremities; and these are multiplied, day after day, by a succession of similar pustules, which continue to rise and decline for several weeks until the skin is thickly studded with the eruption, under various phases. For, as the successive pustules go through their stages of inflammation, suppuration, scabbing, and desquamation, at similar periods after their rise, examples of all these conditions are necessarily seen at the same time; the rising pustules exhibiting a bright red hue at the base, which changes to a purple or chocolate tinge as the inflammation declines, and the little laminated scabs form upon their tops. When these fall off, a dark stain is left upon the site of the pustules. The eruption is sometimes confined to the extremities, but it frequently extends also over the trunk, face, and scalp.

The febrile symptoms are diminished, but not removed, on the

appearance of the eruption; for a constant hectic continues during the progress of the disease. It is accompanied by great languor, and much depression, both of the spirits and muscular strength; by headach, and pains of the limbs; and by restlessness and impaired digestion with irregularity of the bowels. There is commonly some degree of conjunctivitis, and the fauces are the seat of slow inflammation, accompanied by superficial ulcerations.

This disease is stated by Bateman to continue from two to four months, in the course of which time, by the aid of vegetable tonics, cinchona, sarsaparilla, serpentaria, &c. with antimonials, and the warm bath, the constitution gradually throws off the morbid condition which gives rise to it. He adds that the administration of mercury is neither necessary to its cure, nor appears to accelerate recovery.[1]

Dr Monteath tells us that the resemblance of the iritis produced by this eruption to that which is the consequence of syphilis, is so striking, that for several years of his practice he invariably treated the cases he met with, and successfully, by the free use of mercury, believing them to be syphilitic. "The small circle of the iris, and the border of the pupil," adds he, "are often studded with the small reddish-yellow papulæ or pustules, so characteristic of the venereal iritis. It was in consequence of several such cases applying to me with the disease evidently declining, and the pupil clearing, after two or three weeks' continuance, without the patient having taken one grain of mercury, and sometimes almost without any treatment that could have been useful, that I first saw my error, and felt satisfied that these cases were not syphilitic."[2]

Notwithstanding the possibility of this iritis being cured without mercury, and the fact that it is occasionally aggravated[3] by an attempt to mercurialize the system, still an alterative course of this medicine is to be omitted, neither in this nor in any of the other pseudo-syphilitic varieties of iritis. They will in general yield to such a course, aided by sarsaparilla, local bleeding, blisters behind the ears, the application of belladonna to the eyebrow, a mild diet, quietude of the general frame and of the inflamed organ. Turpentine, as recommended by Mr Carmichael for syphilitic iritis, is worthy of a trial in the pseudo-syphilitic.

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[1] Practical Synopsis of Cutaneous Diseases, page 187; London, 1819.
[2] Glasgow Medical Journal; Vol. ii. p. 138; Glasgow, 1829.
[3] See a case which occurred in the practice of Mr Arnott, related in the Quarterly Journal of Foreign Medicine and Surgery; Vol. i. p. 78; London, 1819.

SECTION XXI.—GONORRHŒAL IRITIS.

That gonorrhœa is productive, through the medium of the constitution, of synovitis and iritis, has generally appeared so unlikely

to be the case, that the fact has very slowly been admitted by medical practitioners.[1]

The inflammation of the synovial membranes, which arises from gonorrhœa, seldom occurs until the decline of the discharge from the urethra. It affects the large joints, and especially the knees; is attended with copious effusion into the synovial cavities, and a corresponding degree of swelling; and is spoken of under the name of gonorrhœal rheumatism. The pain and fever, which attend it, are generally severe, and the cure tedious.[2]

Symptoms. The iritis, which owes its origin to gonorrhœa, may or may not be preceded by synovitis. In general, the inflammation of the eye is very severe. It often commences with redness of the conjunctiva and sclerotica, and a striking haziness of the lining membrane of the cornea. The inflammation speedily affects the anterior surface of the iris, which loses its natural colour. The disease for some days appears to be an aquo-capsulitis. It then merges into an iritis serosa. The pupil becomes contracted, and the vision dim. A profuse effusion of coagulable lymph now takes place, speedily filling the pupil, and sometimes falling in considerable masses into the anterior chamber. The anterior chamber is sometimes almost filled with the effused lymph. In fact, no other variety of iritis presents this symptom in the same degree. There is violent pain in and round the eye, with epiphora and intolerance of light. I have seen considerable chemosis, or conjunctival œdema attend gonorrhœal iritis; but there is no purulent discharge from the conjunctiva. There are no tubercles or abscesses on the surface of the iris, as in syphilitic iritis.

The patients, who have been observed to suffer from gonorrhœal synovitis and iritis, have generally been young men, of scrofulous constitution, who lived hard, and were careless of exposure to cold. Each time the patient catches gonorrhœa, he is liable to an attack of synovitis or iritis, or suffers first from the one and afterwards from the other. In some cases, however, there has been no new gonorrhœa, although a second or a third attack of inflammation has affected the joints or the eye. Over-exertion of sight has sometimes produced a new attack of severe gonorrhœal iritis. Generally one eye only is affected; sometimes the same eye suffers repeatedly. In other instances, first the one eye is attacked, and next time the other is inflamed. Rarely are both eyes affected at once.

The patient is generally troubled with gleet, when the iritis occurs. In some cases, the iritis alternates with synovitis and gonorrhœa, so that when one of them is present, the others are gone. It rarely happens that all three are present at once. In many instances, the patients are harassed for years by a succession of the three, and at last are left in a state of great debility, their sight much impaired, and several of their joints incapable of motion.

Prognosis. The gonorrhœal is generally more rapid in its progress than any of the other varieties of iritis, and is one of the most severe and formidable, while it lasts; but it yields more promptly

to decided treatment than any of the rest, and affords examples of perfect recovery, even when the aqueous chambers are filled with lymph. A first or second attack, energetically treated, gives way readily, and absorption proceeds rapidly, so that it is rarely the case that under such circumstances, tags are left between the iris and the capsule. The patient often suffers several severe attacks, and yet vision is preserved entire. It is only from very numerous relapses, and when the treatment has been originally mismanaged, that the pupil is left irregular and contracted, and vision permanently deteriorated.

Treatment. Repeated and copious venesection; leeches round the eye; calomel, with opium, in frequent doses, so as rapidly to affect the system; and the application of belladonna make up the treatment. If the calomel purges at first, the benefit is augmented; if it does not do so, a dose of castor oil should be given and repeated occasionally during the treatment. I have treated the disease very successfully with mercurial frictions after depletion had been freely employed. Counter-irritation, and especially blisters to the temple, do good.[3]

Case 220.—Major ——, aged 25, contracted gonorrhœa in July 1809. In about a fortnight after the appearance of the disease, he was seized with the usual symptoms of hernia humoralis. As these abated, pain and swelling commenced in the right knee, and being at this time under the necessity of travelling in an open carriage for a couple of days, at the end of the journey the pain and swelling had extended to the other knee, and to the foot and toes, especially the articulation of the great toe. Suffering under excruciating pain, and wholly deprived of the use of his limbs, he came under the care of Sir Henry Halford; but no treatment seemed to possess any power in removing the complaint; and, in addition, his right eye was suddenly attacked by a very violent inflammation, which threatened destruction to the organ. Having given up the use of medicine, he went to the country for the restoration of his health, and after being there three weeks, the gonorrhœa again increased without any abatement of the other symptoms. The swelling and stiffness of the joints rendered him scarcely able to crawl without assistance. The use of the warm bath and a residence by the sea were recommended. From the former, he experienced little apparent benefit, but after a very tedious convalescence of two years he found himself able to join his regiment in Spain. From this time he recovered the wonted use of his limbs, and experienced no return of his complaint, though exposed to all the hardships of the campaign of 1812. After exposure to a current of air, when in a state of perspiration, he was seized with an intermittent fever, and obliged to return to England. At this time he had some increase of the stiffness of his joints. He continued to suffer from ague, and an impaired state of health, for nearly 12 months, when he returned to the active duties of his profession, and for some time enjoyed perfect health, and the free use of all his joints, till December 1814, when he again contracted gonorrhœa, with symptoms of unusual violence. In a fortnight the discharge began to abate, and violent pain with swelling attacked the great toe, and metatarsal ligaments of the right foot. The disease then proceeded to the knees, with the same violence of pain and swelling as on the former occasion. As the violence of the symptoms began to abate in the knees, the left eye was attacked by violent ophthalmia, which excited great alarm for its safety.

Dr Vetch saw this patient in his convalescence from both the attacks of ophthalmia. The last inflammation of the eye appeared to have had its seat in the sclerotic coat, and on examining it more closely, Dr V. found an irregular and contracted pupil, with some opacity of the capsule of the lens, and adhesion between it and the iris. On causing him to shut the sound eye, the vision of the

left was found very much impaired. Under the use of belladonna, and the muriate of mercury, the eye ultimately recovered beyond what Dr V. had encouraged the patient to expect. Great thickening of the synovial membrane of the knee-joints remained in 1816, and the patient was still incapable of standing or walking. The urethra continued subject to returns of gonorrhœal discharge.[4]

The following particulars of this case are deserving of attention. On the first attack of ophthalmia, the right eye was the seat of the disease, on the second, the left; in neither was there any symptom of purulency or chemosis, to indicate disease of the conjunctiva; the disease in the urethra was neither suppressed nor modified by the attacks of ophthalmia; the last attack was decidedly one of rheumatic inflammation of the sclerotic coat and iris, an event (Dr Vetch thinks) of more frequent occurrence, though more liable to be overlooked, in connexion with gonorrhœa, than purulent inflammation of the conjunctiva.

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[1] Gonorrhœa leads, in some instances, to inflammation of the serous membranes. In one of my patients, it seemed to produce chronic peritonitis; and in another, synovitis, followed by inflammation of all the internal serous membranes, with tubercular depositions. Both cases ended fatally.

[2] Swediaur, Treatise upon the Symptoms, Consequences, Nature, and Treatment of Venereal, or Syphilitic, Diseases; Vol. i. p. 252; London, 1819.

[3] On Gonorrhœal Iritis, the reader may consult the following works. Brodie on the Diseases of the Joints; pp. 55, 60; London, 1818. Cooper's Lectures on the Principles and Practice of Surgery, p. 482; London, 1835. Lawrence on the Venereal Diseases of the Eye; p. 53; London, 1830. Graves, in London Medical Gazette; Vol. xxiii. p. 440. Lawrence, in Ibid. p. 511.

[4] Vetch's Practical Treatise on the Diseases of the Eye; p. 195; London, 1820.

SECTION XXII.—SCROFULOUS IRITIS.[1]

The iris is occasionally the seat of *primary* scrofulous inflammation, and a *secondary* scrofulous iritis is by no means uncommon. Cold affecting a scrofulous subject, occasionally brings on a mixed or compound ophthalmia, partly phlyctenular, partly iritic; or at least, we meet with instances in which inflammation of the latter sort so quickly supervenes to the former, that we may regard them as affording examples of *primary* scrofulous iritis. Such cases sometimes assume an acute course, much more frequently a chronic one.

1. The following case, quoted[2] by Dr Monteath from the journals of the Glasgow Eye Infirmary, affords a good illustration of *acute primary* scrofulous iritis.

Case 221.—Robert Fleminster, aged 16, applied on the 5th August 1827, with sclerotitis and iritis of the left eye, which had resisted remedies for a month. Six leeches were applied to the temple, and he was put on 2 grains of calomel with a quarter of a grain of opium, morning and evening. In eight days the inflammation was gone, and the sight restored nearly to its natural state. On the 17th he was dismissed cured. Iritis being of rare occurrence in children, Dr M. suspected this case, and pointed it out as probably scrofulous. What occurred in the other eye, proved the suspicion to be just; for on the 24th, he was admitted for

an attack of distinct external scrofulous inflammation of the other eye, with pustules and an ulcer at the border of the cornea. The solution of the nitras argenti was had recourse to, two leeches were applied to the temple, and a blister behind the ear, and he was directed to bathe the eye with a very weak solution of corrosive sublimate. On the 27th he was no better, and the colour of the iris was observed to be changed. It was now evident that the inflammation would become iritic, as it had done in the other eye. Four leeches were, therefore, applied to the temple, and the pills of calomel and opium commenced again, as before. On the 31st the inflammation appeared still advancing, and the iris becoming more affected. The leeches were repeated, and the calomel with opium continued. In five days after this, the mouth was sore, and the inflammation nearly gone. The mercury was now omitted; and, on the 14th September, he was dismissed cured.

The readiness with which this case of acute primary scrofulous iritis yielded to appropriate treatment is worthy of attention. Whenever iritis is observed in a very young person, scrofula may be suspected as the predisposing cause, the other species of iritic inflammation being rare in childhood. The treatment must be such as was employed in the case just quoted; that is to say, in addition to the treatment demanded by scrofulous ophthalmia, calomel and opium must be given till the mouth is affected. The pupil also ought to be kept under the influence of belladonna.

2. *Chronic primary* scrofulous iritis is characterized by the age of the patients, who are generally children under puberty; its slowness, compared with the progress of the other species; the disease being generally attended with but slight pain, the inflammation in a great measure confined to the serous covering of the iris, and productive of very little lymphatic effusion. In such cases, zonular redness of the sclerotica, greenness and darkness of the iris, and fixedness of the pupil, may often be observed for many weeks together, without any farther morbid change, so slow is the progress of the disease. There is also in many cases, little or no pain or fever, and the patient often sleeps well. At length the pupil is observed to become tagged to the capsule, either partially or almost completely, and the capsule becomes opaque from effused lymph. Allowed to proceed in its course, the disease is now attended with more pain in and round the eye, and sometimes with considerable intolerance of light. The iris bulges forward towards the cornea, the pupil is obliterated, and the cornea and anterior half of the eye become unnaturally convex; myopia, hardness of the eye, and amaurosis follow more or less promptly. In some cases, the eyeball becomes boggy and atrophic. In other cases, choroiditis supervenes, with thinning of the sclerotica.

This is a disease not easily cured, especially after it has continued for a considerable length of time. It is not nearly so much under control as rheumatic, or even syphilitic iritis.

Tonics are undoubtedly useful in chronic scrofulous iritis, as in all other scrofulous diseases. Much good will generally be accomplished by change of air, and the use of sulphate of quina. When there is merely intolerance of light, smallness of the pupil, dulness or discoloration of the iris, with zonular redness, without effused lymph, or adhesions of the pupil, mercury is not called for, and

sulphate of quina is more likely to do good. But it cannot be denied, that against effusion of lymph in scrofulous iritis, mercury is the most effectual remedy, and quina is not to be trusted. When the subject is feeble and feverish, with the signs present of lymphatic effusion, quina may be given, along with calomel and opium. I lately attended a young man with chronic scrofulous iritis, who derived much benefit from 6 grains of quina daily, calomel with opium at bedtime, friction of the head with laudanum and belladonna, and fomentations of the eyes with belladonna and hot water. The hydriodate of potass, in doses of 5 grains, thrice a-day, proves useful.

3. A similar plan of cure must be followed in cases of *secondary* scrofulous iritis. We call this variety *secondary*, not only because inflammation of the cornea is the usual precursor of any affection of the iris, but because the iritis appears to arise more in consequence of the continuance of corneitis, and the spread of inflammation from one part of the eye to another, than from any new external or internal cause operating on the iris itself. I have already hinted, (page 448) at the difficulty of discerning, through the inflamed cornea, the exact state of the iris and pupil. Several of the symptoms, also, which attend scrofulous corneitis and iritis, are of an equivocal sort, for the zonular inflammation of the sclerotica, the supra-ocular or circumorbital pain, and the impaired state of vision, are common to iritis and corneitis in their separate state, as well as when they exist together. When the opacity of the cornea is not very great, we shall be able, however, to discern at least the size, and degree of mobility, possessed by the pupil. If that aperture is contracted, irregular, and motionless, there can be no doubt that iritis is or has been present. But in many cases, by concentrating the light upon the cornea through a double convex lens, we may observe even the discoloration of the iris, and the whitish web of effused lymph occupying the pupil.

Neglected cases of this compound ophthalmia are frequently met with, in which, from the low state of the inflammation and slightness of the pain, the disease has been allowed to go on for years, till at last vision has become almost extinct. A remarkable circumstance in such neglected cases is the great degree of softness or bogginess which both the cornea and the sclerotica present, on being pressed with the finger. This I regard as a very unfavourable sign; denoting in fact a disorganization of the vitreous humour, always attended by a considerable degree of amaurosis.

Whenever iritis is observed to co-exist with scrofulous corneitis, an attempt must be made by mercury and belladonna, to counteract the narrowed state of the pupil, and the effusion of lymph from the iris. From the peculiar constitution of the subjects of this iritis, as well as the chronic nature of the disease, the administration of mercury must be conducted with more than ordinary caution and patience; the gums will in the first instance require to be decidedly affected, after which repeated gentle courses of the medicine will be

necessary, while the system must be supported during the intervals, by nourishing diet and the use of tonics, and especially sulphate of quina.

We must beware of employing stimulants, with the view of clearing the cornea, so long as there is any suspicion of active inflammation being present in the iris; else we may readily bring on such a degree of irritation, as shall end in annihilation of the anterior chamber, and of course in irreparable loss of sight.

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[1] *Ophthalmia scrofulosa interna.*
[2] Glasgow Medical Journal; Vol. ii. p. 132; Glasgow, 1829.

SECTION XXIII.—ARTHRITIC IRITIS.[1]

The disease described by the German ophthalmologists under the name of *arthritic ophthalmia*, is known by many remarkable characters, and is unquestionably dependent upon a peculiar state of the constitution. The ophthalmiæ already considered are all of them connected with some appreciable cause; but I must confess the nature of arthritic ophthalmia is to me unknown. If it is a gouty inflammation, then gout is a much more frequent disease than the practitioners of this country are disposed to admit, and often occurs among the poor and ill-fed. In this country, gout is a disease rarely recognised in any form, except among the opulent and luxurious; while in the wine countries of the continent of Europe, and especially in Austria, where wine is the beverage of all ranks, gout, and especially what we term irregular gout, is regarded as common even among the poorest of the people.

It is certain that arthritic iritis rarely occurs in what may be termed the first or plethoric period of gout, that is, while the patients still retain strong powers of digestion, and, having the means and the inclination, regale themselves with large supplies of food and drink. When it attacks gouty subjects, it occurs in the second or asthenic period of the disease, after repeated attacks have produced depression of body and mind, with dyspepsia, flatulence, languor, and deficient excretions.

I have seldom met with this disease in regular gouty constitutions. The subjects have in general been above 50 years of age, in many instances tobacco-smokers and whisky-drinkers, but not always so; they have often laboured under rheumatic affections, been troubled much with headach, bad gums and teeth, acidity, flatulence, and lowness of spirits. I have not been able to determine the diathesis which predisposes to this ophthalmia. I use *arthritic*, then, as a conventional term, without adopting it in the strict sense of gouty.

The Germans regard abdominal congestion or plethora as the

great predisposing cause of arthritic ophthalmia. They trace the plethoric state of the abdominal viscera to heavy meals, and improper food, producing deposition of fat, costiveness, and hæmorrhoids. It is not improbable, that the diathesis on which arthritic ophthalmia depends, is the result of deteriorated digestion. The subjects of this disease are too dependent on stimulants for their appetite, and for the disposal of their aliment. Their stomach produces unhealthy chyle, and this deteriorates their blood; the circulation becomes disordered; inflammatory diseases of unhealthy character ensue, and among these ophthalmia.

Arthritic iritis originates in two ways. In one case, it is the primary and sole affection of the eye; in another, an individual of the peculiar constitution in question being affected with some common ophthalmia, as rheumatic, catarrho-rheumatic, syphilitic, or traumatic, this degenerates into the arthritic. The same thing occasionally happens in regard to syphilitic iritis. The arthritic originates more frequently in this way than in the other.

Symptoms. The general symptoms of iritis are present in the arthritic species; namely, zonular sclerotitis, discoloration of the iris, turbidness of the pupil, with changes in its shape, size, and mobility, impaired vision, and pain in and around the eye. These symptoms, however, are modified in such a manner as to afford ground for a ready diagnosis.

1. *Redness.* The conjunctiva is loaded with enlarged vessels as well as the sclerotica. The redness is of a purple hue. The visible arteries of the eye, emerging from the recti muscles, or perhaps rather the accompanying veins, show from the very first a strong disposition to become varicose (*Fig.* 49.), and at length are so strikingly dilated as to form a characteristic symptom of arthritic iritis. The sclerotica loses its natural appearance, and becomes of a dirty greyish-violet colour. Most of these appearances, and especially the livid colour and varicose dilatation of the blood-vessels, are regarded as indicative of a great tendency to atony, which may account for this variety of iritis being much less amenable to antiphlogistic treatment than the others.

2. *Arthritic ring.* What is strongly insisted on as a diagnostic mark of arthritic iritis, is the existence of a narrow ring of a bluish-white colour at the edge of the cornea. This ring sometimes does not occur, particularly at the commencement of the disease, all round the cornea, but only at its temporal and nasal sides. The ring in question, which must not be confounded with the *arcus senilis*, is formed by the edge of the sclerotica, which naturally overlaps the cornea, and which becomes thicker and more opaque as age advances. In arthritic iritis, it is seen in contrast between the abruptly terminating red sclerotic zone on the one hand, and the transparent cornea on the other. Its importance, as a diagnostic sign of arthritic ophthalmia, has been exaggerated; for we sometimes observe it in syphilitic or rheumatic iritis, especially when these occur in subjects far advanced in life.[2]

3. *Changes in the iris and pupil; glaucoma; amaurosis; atrophy of the eye.* Beer has described the changes in the iris and pupil as varying in two different habits of body. I have witnessed, however, both sets of changes in the same individual. In the right eye, the patient presented the contracted pupil, and in a subsequent attack affecting the left iris, the expanded pupil. This difference, I conceive to depend on the co-existence of a sensible state of the retina in the one case, and of amaurosis in the other. The retina being sensible, the pupil contracts during arthritic ophthalmia; when insensible, it expands.

In some individuals, (Beer says in those who are of a meagre and irritable habit, and tense fibre,) the pupil contracts, is filled with effused lymph, and becomes adherent to the capsule, as is generally the case in the other species of iritis. In such cases, the only characteristic symptom, besides the white ring round the cornea, is a varicose state of the blood-vessels of the iris, so that after the disease has fully developed itself, they may be discerned ramifying on the surface of that membrane, or forming a vascular wreath within the verge of the contracted pupil. The pigment of the iris sometimes seems absorbed in such cases. Fragments of it are often seen sticking to the capsule. Before it arrives at this stage, the inflammation is always attended with general fever. If the eye is left to itself, it does not suppurate, but its contents begin to be absorbed, and at last its size is extremely diminished.

In others, again, (Beer says in those who are of a gross habit of body, possess little sensibility, and have a lax fibre,) the iris instead of expanding, contracts remarkably, and at the same time loses its motion; signs of attending amaurosis. The pupil is not always dilated uniformly along its whole circumference; not unfrequently the iris contracts more towards the temporal and nasal sides of the eye, so that the pupil assumes an oval shape; indeed, the iris sometimes becomes so narrow on the two sides mentioned, especially on the temporal, as almost to disappear. Along with these changes, there is no effusion of lymph, nor any abscess on the surface of the iris. The edge of the pupil is often seen fringed with pigmentum nigrum. The enlarged pupil loses its natural black colour, and presents the greyish-green reflection, characteristic of glaucoma. After a time, the lens is plainly seen to have lost its transparency, and to have assumed an opaque sea-green colour; it also swells considerably (*hypertrophia lentis*), and projects through the pupil (*Fig.* 52.), into the anterior chamber.[3] The iris, lying upon the enlarged lens, seems much altered from its natural texture; it looks soft, and as if it had undergone a degree of maceration, and at a later period of the disease its pupillary edge is curled back. The varicose state of the vessels of the conjunctiva increases, while those of the choroid becoming similarly affected, form bluish knots, which shine through the sclerotica. The anterior part of this tunic be-

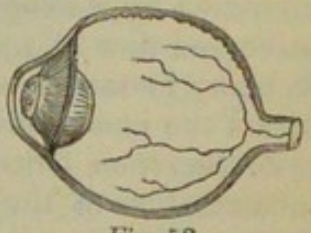

Fig. 52.

ing attenuated by the pressure of the morbid parts within, a dark ring shines through it, exactly occupying the situation of the corpus ciliare. The eyeball feels much harder to the touch than natural. Vision is by this time totally gone. The inflammatory symptoms now begin to decrease, and absorption of the contents of the eyeball follows, as in the former instance. Sometimes in consequence of the hypertrophied lens pressing against the cornea, this part becomes inflamed, ulcerates, and gives way, so that the lens is evacuated, along with a considerable quantity of blood; after which the eye shrinks to a small size. In other cases, there is reason to believe that, the vitreous humour being gradually absorbed, a watery effusion takes place between the choroid and the retina, in consequence of which the retina is compressed into the form of a cord, stretching from the entrance of the optic nerve to the back of the lens.[4] This state is generally attended by ossification of the choroid. Ossification of the capsule of the lens is also not unfrequent in the atrophic stage of arthritic iritis.

The form of disease just described, although accounted by Beer one of the varieties of arthritic iritis, evidently involves the other textures of the eye more than the iris. Mr Lawrence[5] and Dr Canstatt[6] have therefore objected to Beer's classification of the affection; the former describing it under the name of *arthritic inflammation of the internal tunics*, and the latter under that of *chorioideitis*. From the suddenness with which vision is extinguished in the affection, along with the dilatation of the pupil which attends it, it is probable the retina is as much the original seat of the disease as any other texture of the eye, and certainly more so than the iris. Mr Tyrrell describes[7] the same disease under the name of *retinitis*.

4. *Pain.* It sometimes happens that before any other signs of arthritic ophthalmia make their appearance, the patient is troubled with peculiar tingling sensations about the eye, and a feeling of creeping over the skin of the face. The eye and the orbit soon become the seat of racking pain, extending to the temple, and shooting down into the jaws. While the changes of structure above detailed are going on, attacks of severe pain always occur, they are greatly aggravated in general towards midnight, but in some cases abate little at any period of the 24 hours. The patient is warned of their approach by a stinging sensation all round the eye, followed by an increased flow of tears; after which, the pain sets in, and becomes, in many instances, so violent, that the patient writhes under it, and utters the most piercing cries of distress.

5. *Secretion from eyelids.* The epiphora which attends arthritic inflammation of the iris, leads to frequent opening and shutting of the eyelids, by means of which there is forced out from between them a peculiar white frothy matter, which Beer regarded as diagnostic of arthritic ophthalmia, and which is easily distinguished from any of the ordinary secretions of the conjunctiva or Meibomian follicles. This foam or froth appears, at first sight, to consist of ex-

remely minute globules of watery fluid, but on more attentive observation it is found to consist of a thickish substance of a sebaceous nature. It has not, I believe, been chemically examined.

Constitutional symptoms. The subjects of arthritic iritis will be found to have suffered much more frequently from the symptoms of irregular than of regular gout. In general, they have long been the victims of various affections of the stomach, such as nausea, vomiting, flatulency, acid eructations, and pains in the epigastrium. Irregular bowels, piles, pains and cramps in different parts of the trunk and extremities, headachs, giddiness, an eruption of suppurating tubercles on the face, with lowness of spirits, prevail, more or less, in those who are attacked by this species of ophthalmia. One of the worst cases I have seen, was in a person, who without being a drunkard, had for many years laboured under a great degree of gutta rosacea. An erroneous plan of diet, a sedentary life, and an indulgence in alcoholic fluids and tobacco, will in general be found to have been followed by those who suffer from this iritis.

The local symptoms already detailed afford sufficient ground for diagnosis. But it may be added, that arthritic inflammation in many instances attacks the eye, as it does other parts of the body, without any apparent exciting cause, while rheumatic iritis can generally be traced to some exposure to cold. Arthritic iritis sometimes attacks the patient in the middle of the night, when quiet and warm in bed, arising in fact from no external exciting cause, but from the state of the constitution, influenced perhaps by the digestive organs.

Prognosis. The prognosis is more unfavourable than in any of the other species of iritis. A first attack may continue for many months, and though at last the symptoms may yield, and a tolerable degree of vision be saved, a renewal of the disease, perhaps in the other eye from that first affected, is always to be dreaded, owing to the extreme difficulty, not to say impossibility, of removing the arthritic disposition. I have seen the patient, while recovering in one eye, suddenly seized in the other, a thing scarcely ever witnessed in rheumatic or syphilitic iritis. Besides its obstinacy, there is another circumstance connected with arthritic inflammation of the eye, which renders the prognosis peculiarly unfavourable, namely, the strong tendency which the disease has to affect the choroid, retina, and humours, so that though the attack may for several successive times be confined chiefly to the iris, the rest of the eyeball becomes at length implicated and destroyed.

Cure. The three most important indications are, Remove the inflammation; subdue the pain; and prevent relapses.

1. Though inflammation be, as Dr Monteath has well remarked, the proximate cause of all the evils in this species of iritis, as in the traumatic or any other, yet, as it is of an unsound and peculiar nature, and dependent on a constitutional cause, it cannot be eradicated by the vigorous use of mere antiphlogistic means. A notion

has even prevailed that general bleeding is seldom advisable in arthritic iritis, that it may aggravate the subsequent course of the disease, and that even local bleeding, by cupping and leeches, must be very cautiously employed. I have witnessed, however, excellent effects from general bleeding in this disease. With a full hard pulse, hot skin, and loaded tongue, we need not hesitate to bleed, purge, and administer colchicum; but even when the pulse has not been strong, I have bled at the arm, and given mercury, with much advantage. In most cases, the application of leeches to the temple, forehead, and eyelids, will be found advantageous.

The bowels ought to be freely opened by one or more smart doses of calomel and colocynth, followed after some hours by salts and senna. If the tongue still continues foul and the mouth bitter, a common dose of ipecacuan and tartar emetic may be of much service. After this, the bowels are to be kept open by purgatives, and the skin relaxed by some mild diaphoretic.

The vinous tincture of colchicum root proves useful in abating arthritic inflammation of the eye, after bleeding and purging have been employed. Twenty-five drops may be given every three or four hours.

The free use of mercury is as unsuitable in arthritic iritis as profuse blood-letting. An alterative course of this medicine, however, will be of much service, and may be continued for weeks or months, along with other suitable remedies, so as to change the vitiated habits of the digestive organs. To arrest the morbid action of the capillaries, and check the effusion of lymph, in this iritis, by the sudden introduction of mercury, as in other species of this disease, has been found impracticable. Whether any better effects are to be derived from turpentine, as recommended by Mr Carmichael, future experience must determine.

I have sometimes derived very striking benefit from the use of the precipitated carbonate of iron, in arthritic ophthalmia, after depletion and mercury had been employed without relief.

Sulphate of quina is another remedy which does good. I have found it very useful, along with Fowler's solution.

Arthritis has been supposed to be analogous to that state of the constitution in which uric acid is deposited from the urine. If this is correct, it affords an explanation of the benefit derived, in gouty cases, from alkaline medicines. These may be tried in arthritic iritis.

Counter-irritation, by blistering and otherwise, is of great service. Beer particularly recommends the bringing out of an artificial eruption by means of tartar emetic ointment. A gentleman had long suffered from arthritic inflammation of his eye, accompanied by severe pain in the head. Mr Wardrop recommended him to apply sinapisms to each foot, and being a man of great fortitude, he allowed them to remain on, until so violent an inflammation ensued, that it terminated in ulceration of the skin; but the pain in his eyes and head was completely relieved. Some years afterwards, on Mr Wardrop's inquiring if he had ever had any return of the inflamma-

tion in his eyes, he answered with a smile, that the sinapisms had completely removed them.[8]

Dry warmth, applied by means of several folds of old linen, heated at the fire, hung over the eye, and renewed frequently, is the only direct application to the inflamed organ which can at all times be used with impunity. It promotes an increase of the insensible perspiration, and in this way is of use. Cold applications uniformly do harm; and even hot fomentations, with poppy decoction and the like, are not always safe, especially if the parts are left wet and exposed after their application.

2. To moderate and remove as quickly as possible the periodical fits of pain, is a matter of great importance. For this purpose, Beer recommends simply opium, moistened to the consistence of a liniment, to be rubbed in, round the orbit. Mercurial ointment with opium and extract of belladonna, volatile liniment with laudanum, or tincture of tobacco, may be used for the same purpose. The friction is to be performed when the evening paroxysm is expected to recur, and repeated during the night if the pain is not prevented, or if it returns at any period of the day or night. The internal use of opium ought if possible to be avoided, on account of the disordered state of the digestive organs. Should the pain, however, become very urgent, it ought not to be withheld. Considerable relief may also be obtained from the internal use of stramonium, hyosciamus, belladonna, colchicum, and prussic acid, none of which have the same bad effects on the liver and bowels as opium. I have found a vinous solution of murias hydrargyri with belladonna, a convenient form for exhibiting the latter medicine as a sedative, and the former as an alterative, in this disease. The causes which seem to produce accessions of pain must be carefully avoided; as, agitation of mind, sudden changes of temperature, &c.

3. Relapses are to be warded off, partly by constitutional, partly by local means.

The constitutional preventive means are partly medicinal, but chiefly dietetical. The general health must be confirmed as much as possible, by proper management of the digestive organs, the kidneys, and the skin. A temperate diet, careful regulation of the bowels by gentle aperients, and a free action of the kidneys, promoted by the use of magnesia or soda water, or of some mild aperient and diuretic mineral water, will be of much benefit. Daily tepid sponging of the body, followed by dry friction, will be of service by promoting an abundant secretion from the skin. The patient should breathe pure country air, and, carefully avoiding either to overheat himself, or to cool himself too quickly, should engage in regular and continued exercise of various kinds. If he has long been accustomed to wine, he may be allowed a small quantity of spirits and water.

After an attack of gouty inflammation in the foot, we see the parts continue long tumid, weak, and morbidly sensible, while the most trifling accident, internal or external, is apt to produce a re-

lapse. The same is observed in regard to the eye, only that in this organ we have the advantage of directly witnessing the exceedingly relaxed, varicose, and livid state of the blood-vessels, an indication of how much is wanting to restore the affected parts to their natural tone. Even after an acute attack of arthritic iritis is subdued, some counter-irritating means ought to be continued, such as a seton in the neck, and recourse should be had to the use of local applications of a tonic kind. As a means of this sort, the Germans are in the way of using small bags of dried aromatic herbs, suspended over the eye. The bags are made of old linen, and are quilted, so as to keep the herbs equally spread out. The aroma, constantly emanating from the herbs, imparts a permanent, pleasant, and useful stimulus to the debilitated blood-vessels and nerves. The best herbs for this purpose are bruised chamomile flowers, sage, rosemary, marjorum, and the like, with or without the addition of a little powdered camphor. If the exhaled aroma reproduces redness of the eye, or aversion to light, this will indicate that the proper time for the use of local stimuli has not yet arrived, and that they must be postponed. Friction round the orbit once or twice daily with alcohol, tinctura aromatica ammoniata, or the like, is another local preventive measure which is found of use. Even stimulants to the eye, as vinum opii and red precipitate salve, beginning these preparations in a dilute state, and gradually augmenting their strength, are found to abate the morbid sensibility of the eye, and thus render it less apt to suffer from the ordinary external as well as internal causes which produce inflammation. It must not be forgotten, however, that remedies of this kind, if used before the acute inflammation be subdued, will, as in every other species of iritis, produce the very worst effects.

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[1] *Ophthalmia arthritica.*

[2] See Jones, in London Medical Gazette; Vol. xxiii. p. 817.

[3] Cloquet, Pathologie Chirurgicale; Pl. x. fig. 13; Paris, 1831.

[4] See case of C. D. with dissection, by Mr Watson, in Edinburgh Medical and Surgical Journal; Vol. xxxv. p. 77; Edinburgh, 1831.

[5] Treatise on the Diseases of the Eye; p. 332; London, 1833.

[6] Ueber Markschwamm des Auges und amaurotisches Katzenauge; p. 44; Würzburg, 1831.

[7] Cyclopædia of Practical Surgery; Vol. i. p. 80; London, 1837.

[8] Wardrop's Lectures, in the Lancet, 31st August 1833, p. 713.

SECTION XXIV.—SCLEROTICO-CHOROIDITIS.[1]

As the choroid coat is completely hid from view, and exercises but a subsidiary function, it is not to be wondered at, that while inflammation of every other part of the eye has been accurately discriminated, that of the choroid has hitherto scarcely attracted

attention. In an early stage, choroiditis is one of the least striking of the ophthalmiæ; when far advanced, the signs of disorganization which attend it, are more remarkable than those of vascular action; and while the effects are too serious not to have attracted attention, and even received particular names, the cause of these effects, and the seat of the original disease, have in general escaped observation.

I have already had occasion to mention, that iritis is occasionally attended by inflammation of the choroid. Were we to adopt the common notion, that the iris is a continuation of that membrane, we might be led to conclude, that choroiditis and iritis should always go together. Perhaps, in some degree, this may still be the case. At the same time, from the principal arteries which nourish these two parts being quite distinct in their course and distribution, the idea of a separate iritis, and a separate choroiditis, is *à priori* rendered probable.

For some time, the separate existence of choroiditis was with me rather a matter of speculation, and a conclusion from analogy, than a fact ascertained by observation. I am now convinced, however, that the choroid is sometimes the seat, almost quite independently, of inflammation; that in certain cases of ophthalmia, it is the focus of the disease, and that the neighbouring parts may be as little affected when that is the case, as the sclerotica is in iritis, or the iris in sclerotitis. That it is of importance to distinguish the disease which I am now about to describe, will appear evident, when we consider its dangerous nature. Its symptoms, as we shall immediately see, are very different from those of any other ophthalmia; and although ultimately the whole eye may be involved by inflammation commencing in the choroid, yet choroiditis, in the early stage exists without any signs of disease in the iris, and without any other effects upon the sclerotica and retina, than those which must necessarily arise from the pressure of an inflamed and swoln membrane, placed in contiguity with other membranes more or less susceptible of suffering from that pressure. I consider choroiditis, therefore, as completely a primary and distinct disease. At the same time, it must not be overlooked that choroiditis is apt to be superadded to other ophthalmiæ, and especially to scrofulous corneitis and iritis, and to arthritic iritis.

The subjects of choroiditis are generally adults, and more frequently females than males. Those of scrofulous constitution are more subject to it than others. I have very rarely seen it in children.

Symptoms. 1. *Redness.* One or more of the recto-muscular arteries are enlarged, and running towards the edge of the cornea, are seen to end there in a broad lash of small vessels. There is scarcely ever any general redness over the eyeball, or much inflammation of the conjunctiva. The portion of the sclerotica subjacent to the enlarged vessels frequently presents, in the early stage of the disease, a thickened and fleshy appearance. The conjunctiva also appears thickened. It is probable, that, even in this early stage, a preternatural adhesion takes place between the sclerotica and the choroid.

2. *Discoloration of the white of the eye.* If the disease is checked before any other symptoms manifest themselves than those already mentioned, the portion of sclerotica which was inflamed, frequently continues to appear thickened, but gradually assumes an opaque white colour; but if the disease proceeds, the exterior tunics of the eye, by and by, become attenuated, so that the choroid shows its dark colour through the sclerotica, which therefore appears blue or purplish. This is one of the most remarkable symptoms, and takes place in many cases at a very early period of the disease, the blueness shining obscurely through the inflamed sclerotica and conjunctiva. We often observe one part of the sclerotica thickened and loaded with enlarged vessels, and another part thinned so as to allow the choroid to shine through. The degree of discoloration is different, according to the severity and duration of the attack, being at the early stage merely perceptible on comparing the diseased with the healthy eye, or the diseased side of the eye with the healthy side, while in advanced cases it amounts to a deep blue. About the eighth of an inch behind the edge of the cornea is the most frequent situation of the discoloration, which generally occupies only one side of the eye, but sometimes surrounds the cornea completely. It is at first narrow in extent, but afterwards becomes broader.

3. *Sclerotico-choroid staphyloma.* After continuing for a time discoloured merely, the part affected protrudes. The sclerotica and choroid having become preternatually adherent, and being softened in their texture from the inflammation they have undergone, lose their supporting power. Atrophied and thinned, they cannot sustain the contents of the eyeball, but give way and become protruded. As the previous redness and consequent thinning of the sclerotica commonly occupy only one side of the eyeball, so does the protrusion in question. The protrusion is generally near the cornea, as if the corpus ciliare was the seat of the disease, and more frequently above, or to the temporal side of the cornea, than below, or to its nasal side. In some cases, there is only one protrusion, which may enlarge to the size and prominence of a filbert; in others, a number of tumours, of various sizes, surround the cornea; (*Fig.* 53.) while, in a third set, the whole eye is enlarged, and the sclerotica attenuated in its entire circumference. Such tumours, or protrusions of the choroid have received the names of *cirsophthalmia*, *varicositas oculi*, *hernia choroideæ*, *staphyloma corporis ciliaris*, and *staphyloma scleroticæ*. They generally present numerous varicose vessels ramifying over them.

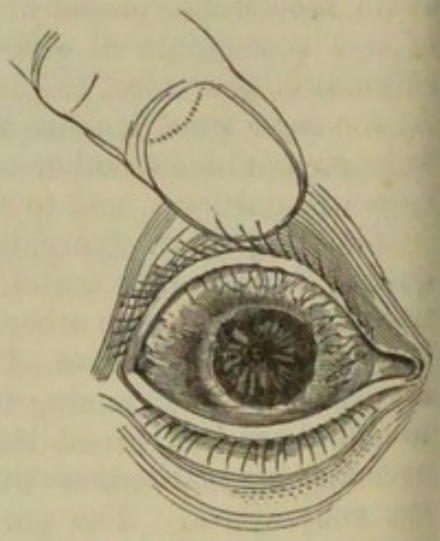

Fig. 53.

The front of the eye, however, is not the only seat of staphyloma

of the sclerotica and choroid. Scarpa tells us, that he had never met with any tumour or elevation of the sclerotica on its anterior surface, resembling a staphyloma; but that he had twice happened to meet, in the dead body with staphyloma of the posterior hemisphere of the sclerotica.

The first time was in the eye of a woman of 40 years of age. The eye was of an oval figure, and upon the whole, more voluminous than the sound eye on the other side. On the posterior hemisphere of the diseased eye, and to the external or temporal side of the entrance of the optic nerve, the sclerotica was elevated in the form of an oblong tumour, like a small nut. As the cornea was sound and pellucid, and the humours still preserved their natural transparency, on looking through the pupil, there appeared towards the bottom of the eye, an unusual brightness, produced by the light penetrating that part of the sclerotica, which had become thin and transparent where it was occupied by the staphyloma. When the eye was opened, the vitreous humour was found entirely disorganized, and converted into limpid water, and the crystalline lens somewhat yellowish, but not opaque. When the posterior hemisphere of the eye was immersed in spirit of wine, with a few drops of nitrous acid added to it, in order to give the retina consistence and opacity, it was distinctly perceived that there was a deficiency of the nervous expansion of the retina within the cavity of the staphyloma; that the choroid was very thin at this part, deprived of its natural colour, and of its usual vascular network; and that the sclerotica, particularly at the apex of the staphyloma was so thin as scarcely to equal the thickness of writing paper. The woman from whom this eye was taken, had lost the faculty of seeing on that side some years before, during an obstinate ophthalmia, attended with most severe, and almost habitual pains in the head.

Scarpa had an opportunity of making similar observations on an eye met with accidentally by Monteggia, of Milan. It was taken from a woman, 35 years of age, was of an oval figure, and longer than its fellow. The staphyloma was situated exactly as in the former instance. The vitreous humour was dissolved; the crystalline capsule was distended by a thin whitish fluid; the lens yellowish, and less than natural; the retina deficient within the staphyloma; the choroid and sclerotica, forming the tumour, thinned, so as to transmit the light. Nothing positive could be ascertained regarding this woman's sight.[2]

4. *Effusions between the sclerotica and choroid, and between the choroid and retina.* That the vessels of the choroid are sometimes greatly enlarged in this disease, does not admit of a doubt. I remember having seen in the hands of Professor Beer, a preparation in which the varices of an inflamed choroid were as large as small peas. At the same time, the distention which the choroid and sclerotica suffer in this disease, is not always owing to thickening of the former coat, or to varicose distention of its blood-vessels, but is often connected with an effusion of watery fluid between the sclero-

tica and the choroid, or between the choroid and the retina. I have already stated the probability that, even in the early stage of the disease, a preternatural adhesion takes place between the sclerotica and choroid. On extirpating a staphyloma of these tunics, I found them firmly adherent to each other, and I think it likely that this is generally the case. At the same time, it has been ascertained by dissection[3] that a watery fluid is sometimes present in sclerotic staphyloma between the sclerotica and the choroid. There are also good grounds for believing that a similar effusion forms occasionally between the choroid and the retina. If the fluid collected in the latter situation is not evacuated by puncturing the staphyloma, it may accumulate to such a degree as to press the retina before it, and having at last produced, by means of its continued pressure, an absorption of the vitreous humour, it will gather the retina into a cord, as sometimes happens in arthritic ophthalmia.

5. *Displacement of the pupil.* Although the iris is seldom affected with inflammation in choroiditis, the pupil, in many of the cases which I have witnessed, underwent a remarkable change of place. The iris is always narrowed towards the portion of the choroid which is affected, and in many instances, the pupil is observed to have moved so much out of its natural situation, as to be almost directly behind the edge of the cornea. Upwards, and upwards and outwards, are the directions in which the pupil is most frequently observed to become displaced. It occasionally continues small and moveable, in other cases it is immovable, but not dilated; in very severe cases it is greatly enlarged, the iris having entirely disappeared at that part of its circumference towards which the displacement of the pupil has happened.

The remarkable displacement of the pupil which attends choroiditis is owing probably to some affection of one or more of the ciliary or iridal nerves, which running forward between the sclerotica and the choroid, pass through the annulus gangliformis, and ultimately reach the iris. This symptom has been remarked by Beer as an attendant on syphilitic iritis. That it is not a constant attendant is well known. I have seen it in other varieties of iritis. It has never been attributed to any affection of the choroid, nor has any explanation of its causes been offered.

The pupil does not return to its place, even although the other symptoms of choroiditis are subdued.

We sometimes observe the iris, in cases of choroiditis, to be of a slate colour, and the pupil to be more or less filled with lymph. These changes denote the previous existence of iritis.

6. *Opacity of the cornea* is not a necessary, although a frequent, attendant on choroiditis. It is generally the edge of the cornea nearest to the portion of affected choroid which becomes opaque, so as to resemble part of a broad arcus senilis, or as if the sclerotica were intruding on the cornea, the rest of the cornea remaining perfectly clear. In other cases, there are pretty extensive, but very irregular spots of whiteness, more the effect apparently of

interrupted nutrition than of inflammation. In some cases, I have observed the cornea smaller than natural, but more frequently it not only becomes almost quite opaque, but partaking in the staphylomatous degeneration of the neighbouring sclerotica, it even undergoes a degree of dilatation, so as to become considerably broader and more prominent than in its natural state, and scarcely distinguishable from the attenuated sclerotica. (*Fig.* 54.) I have sometimes thought that in such cases, a watery effusion might have separated the ciliary ligament, so as to lodge between the cornea and sclerotica externally and the iris and choroid internally. From the affection of the cornea alone, in such cases, independently of the interior changes of the eye, the patient's vision may be almost or altogether lost. *Figures* 52 and 53, represent the eyes of a young woman, a patient of the Glasgow Eye Infirmary. In the right eye, the disease formed a staphyloma of the sclerotica and choroid, around the temporal half of the cornea; in the left eye, the whole eye, including the cornea, partook in the staphylomatous degeneration.

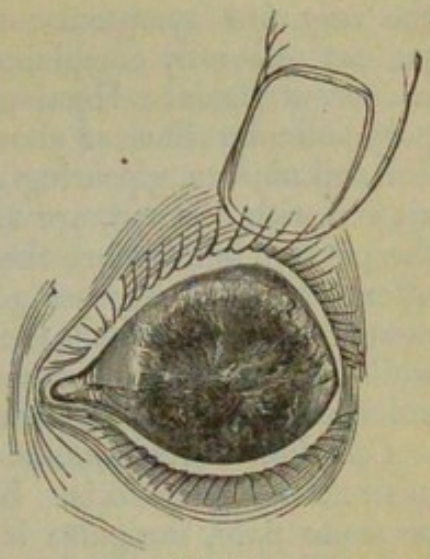

Fig. 54.

7. *Exophthalmos and exophthalmia.* In consequence of choroiditis, the eye may enlarge so much as to protrude from the orbit to a very considerable degree, without much inflammation of the sclerotica and conjunctiva, these tunics being merely thinned by the pressure of the distended choroid. After a time, however, the eye, in this state of exophthalmos, is apt to suffer from external inflammation, in consequence of being but imperfectly protected by the lids, or it may be in consequence of cold or mechanical injury. When the inflammation, thus excited, runs to a great height, the conjunctiva becomes chemosed, puriform fluid is deposited behind the cornea, or between its lamellæ, the eye bursts, continues to swell and protrude still more, assumes a fungous appearance, bleeds profusely, and being productive of great pain and deformity, evidently requires to be extirpated.

8. *Intolerance of light* and *epiphora*, generally attend this disease in a considerable degree.

9. *Pain.* This varies much in different individuals. When there is as yet no protrusion, the pain is moderate; when the sclerotica is much pressed and distended, and especially when this takes place suddenly, and is attended with considerable increase of redness, the pain in the eye becomes severe, and sometimes furious. Hemicrania is also present, affecting principally the top of the head, the high part of the temple, and the cheek. It is not strictly circumorbital, nor is it strikingly nocturnal.

10. *Vision* is variously affected in choroiditis. In some instances,

the very first symptom complained of is dimness of sight. The patient generally complains of photopsia, and not unfrequently of iridescent vision. Hemiopia, all objects to one or other side of a perpendicular line, or above or below a horizontal line, appearing dim, all objects appearing confusedly, and as if double, even when viewed with one eye, are symptoms which not unfrequently distress the patient long before the redness or blueness of the eye attracts attention. If the disease goes on, we sometimes find that total blindness ensues, even when the choroid appears but partially affected; while in other cases the whole eyeball is evidently enlarged and discoloured, and yet a considerable degree of vision is retained.

Constitutional symptoms. 1. Various degrees of febrile excitement attend choroiditis. In the early stage, before distention brings on acute pain, the pulse is not affected; after the patient has suffered much, a cachectic state is apt to follow, with quick pulse, pale or sallow complexion, excessive nervous irritability, and great general weakness. The patient is inactive, complains of coldness of the extremities, and evidently labours under a deficient cutaneous circulation.

2. The digestive organs are frequently much deranged, even from the very first. Want of appetite, frequent acidity of stomach, costiveness, flatulence, and foul tongue, attend the disease in many instances.

Remote and exciting causes. I have been led to ascribe the commencement of inflammation of the choroid to such causes as the following:—

1. Want of exercise; too much confinement within doors.
2. Derangement of the stomach and bowels.
3. Over-use of the eyes, in reading, sewing, miniature-painting, and other minute works.
4. Exposure to too much heat and light, and especially to the glare of hot fires, and to sudden changes from heat to cold.
5. Blows on the eye, and other injuries.

Prognosis. Recovery is always slow. If the disease has gone to any considerable length, it is scarcely ever completely removed. The vestiges of it are in general permanent, even after it has been completely checked in its progress. In many cases, we may reckon ourselves fortunate, if we arrest the disease. Yet it sometimes happens that the cure proceeds to a degree beyond our expectation. I attended a gentleman who many years before had lost all useful vision in the left eye from this disease. The right was now attacked. Both pupils were greatly displaced; the visible arteries of the right eye were much dilated, and the sclerotica at different places considerably attenuated; the left eye was enlarged, of a pretty deep blue colour, and a great part of the cornea opaque. By blood-letting, counter-irritation and other remedies, the disease was arrested in the right eye, and very unexpectedly the left eye recovered to such a degree, that he was again able to read with it an ordinary type.

Treatment. 1. *Blood-letting.* Profuse and repeated blood-letting does more good in the early stage of choroiditis, than all other remedies put together. Yet we might perhaps not be tempted to bleed sufficiently at this period of the disease, from the circumstance that in many instances, there are no external signs of intense inflammation, and the patient does not suffer any acute pain. The practitioner, therefore, who is not acquainted with the nature and symptoms of this ophthalmia, might be apt to trifle away time in the application of a few leeches, when he should be opening the temporal artery, and removing a large quantity of blood. I have known the blueness and evident distention of the sclerotica, which, notwithstanding leeching and other remedies, had continued unabated for many weeks, disappear suddenly and completely, after the loss of 20 or 30 ounces of blood from the temple. Bleeding from the jugular vein, or from the arm, is also highly useful. Twenty-four or more leeches round the eye, every second day, I have seen attended by the best effects.

In chronic cases, we must not neglect the frequent and liberal application of leeches. In the repeated and often severe attacks of pain which occur in the course of sclerotico-choroiditis, if the pulse is not affected, blood taken from the arm is not buffy, and venesection does little good.

2. *Purgatives* are of essential service. The disordered state of the biliary and other digestive organs, indicates the use of calomel as a cholagogue, followed by salts and senna, or some other brisk purgative. Such remedies are to be repeated frequently, during the course of the treatment.

3. *Vapour-bath.* Every means must be adopted likely to equalize the circulation, remove the coldness of the feet, and bring on cutaneous perspiration. One of the most useful remedies for this purpose is the vapour-bath, every second night.

4. *Mercury.* We are naturally led to advise mercury in choroiditis, from observing its happy effects in iritis. In some instances, it has been attended with evident advantage. The form in which I have found it most useful is the blue pill combined with aloes. This combination purges pretty smartly at first, but soon touches the gums. On the whole, however, I must confess, that I have seldom witnessed any remarkable benefit, either from making the mouth sore, or from small doses long continued. I have used this medicine both in friction to the head, and in various forms internally; but it has, in many cases, appeared inert so far as the choroiditis is concerned.

5. *Turpentine* I have tried in one or two cases, but have been unable to come to any conclusion regarding its effects.

6. *Tonics.* After due depletion, I have seen much benefit accrue from the precipitated carbonate of iron, and the sulphate of quina. They may be given separately, or together.

7. *Arseniate of potass.* Under the influence of this medicine, I have had the satisfaction, in a number of instances, to observe the

varicose vessels to shrink, the discoloration and tumour of the sclerotica and choroid diminish, and the patient's vision and health improve. The dose, with which I have generally commenced, is the 32d part of a grain, thrice a-day, in the form of pill.

8. *Counter-irritation* is decidedly useful. A tartar emetic eruption betwixt the shoulders is perhaps the most effectual.

9. *Paracentesis oculi.* Puncturing the sclerotica and choroid, so as to evacuate the aqueous fluid collected between these tunics, or between the choroid and the retina, is a remedy of much importance in the treatment of this disease. It is not to be tried in the acute stage, at least I have not dared to try it except in the chronic stage, and when there was an evident tendency to choroid staphyloma. The operation is performed with a broad cataract needle, which is to be thrust, not in the direction of the lens, which it might readily wound and render opaque, but towards the centre of the vitreous humour. The instrument need not penetrate deeper than the eighth of an inch. A little blood is usually discharged, mixed with aqueous fluid of a slightly glutinous consistence. The operation, though sometimes followed by considerable constitutional disturbance and pain, generally gives great relief to the feeling of distention or pressure in the eye, and to the attending headach. It may be repeated every eight days, or at longer intervals, according to the state of the eye.[4]

10. *Partial or total extirpation of the eye.* Choroid staphyloma, from its size and prominence, may demand extirpation, the tumour merely being removed, and the rest of the eye left. The whole eyeball in one case being enlarged and projecting from the orbit, so much that it could with difficulty be covered by the lids, I passed a ligature through it from the temporal to the nasal side. There immediately drained away a large quantity of aqueous fluid, the coats became flaccid, and I easily snipped off with the scissors the anterior half of the eye. Total extirpation will seldom be necessary in choroid staphyloma, however general it may be, and however much the eye may be protruded.

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[1] *Ophthalmia scorbutica* of Beer.

[2] Trattato delle principali Malattie degli Occhi; Vol. ii. p. 146; Pavia, 1816.

[3] Ammon's Zeitschrift für die Ophthalmologie, Vol. v. p. 363; Heidelberg, 1836.

[4] Martland, in Edinburgh Medical and Surgical Journal; Vol. xxiii. p. 59; Edinburgh, 1825. Lechla, in Ammon's Zeitschrift für die Ophthalmologie; Vol. ii. p. 336; Dresden, 1832.

SECTION XXV.—RETINITIS.

It is easy to understand that the internal inflammations of the eye, as they originate from causes which affect the organ in very different ways, may arise sometimes in one texture, and at other times in another; that in one case the retina shall be first affected,

in another, the choroid, in a third, the iris. The inflammatory action, however, is seldom, if ever confined to the part first affected. We have already seen how inflammation, originating in the iris, spreads to the sclerotica, and to the choroid; and how choroiditis affects the textures both within and without the choroid. In the same way, inflammation commencing in the retina is likely to spread inwards to the vitreous humour, to the capsule of the lens, and to the lens itself, all which parts are nourished by branches from the central artery of the retina; and outwards to the choroid and iris, to the sclerotica and cornea, and to the conjunctiva. Thus an inflammation of the whole eyeball may have a very limited origin.

The retina is not very vascular, and the amazing fatigue which it sustains without injury, shows that it is not very susceptible of inflammation. It is insensible except to light, and therefore when inflamed, no pain is experienced, unless the inflammation spreads to the other textures of the eye.

The morbid anatomy of the eye proves distinctly that the retina suffers in various ways from inflammation, for it sometimes presents the appearances of greatly increased vascularity, in other cases it is in a state of atrophy, or it is changed in colour, adherent to the choroid, altered by suppuration, loaded with calcareous matter, &c.

§ 1. *Acute Retinitis.*

By *acute retinitis*, I mean a violent inflammation of the internal textures of the eyeball, identical with the *ophthalmia interna idiopathica* of Beer, and the *ophthalmitis phlegmonosa* or *ocular phlegmon* of others.

Stages. We may distinguish three stages in the progress of this disease. 1. The stage of photopsia, extending from the beginning of the disease till the time when the retina becomes insensible, and the eye ceases to be photophobic. 2. The stage of suppuration, counting from the cessation of photophobia. 3. The stage of spontaneous rupture, an event which rarely occurs when the disease is idiopathic, although not unfrequent in traumatic cases.

Symptoms. The patient complains of a general feeling of pressure and tension in the whole eyeball. To this there succeeds an obtuse, deep-seated, pulsating pain, which soon extends to the eyebrow and cranium. The power of vision rapidly declines. The pupil is observed to have lost its blackness, and, according to Beer, it becomes much contracted. Without becoming angular or deviating from its natural situation, it at length completely closes, the iris having reached its greatest possible degree of expansion, and seeming no longer to be perforated by any central opening. Mr Lawrence, however, relates a case, which he considers one of retinitis, in which the pupil was slightly dilated. Beer states that long before the pupil is closed, the sensibility of the retina seems extinct; and yet, even when the pupil is closed, and there is no longer any trace of

perception of light from without, the patient experiences a troublesome sensation of fiery spectra with every oscillation of the internal blood-vessels of the eye.

While these changes are taking place, the iris loses its natural colour, becoming greenish or reddish according to its original hue. The anterior chamber is strikingly diminished in size, the iris having advanced towards the cornea. By the time that this projection of the iris is discerned, which is generally when the pupil is still of considerable size, the whole sclerotica is rose-red. The conjunctiva some time after, presents a pretty thick net-work of blood-vessels, and the cornea loses much of its natural lustre. There is now severe inflammatory sympathetic fever, along with insufferable and almost maddening headach. Sometimes it happens that during this period of the disease, the pupil, though much contracted, does not completely close; but it is cloudy, and, on looking at it through a magnifying glass, or even by merely concentrating the light upon it, it is seen to be of a reddish-grey colour.

So severe are the sympathetic fever and headach which attend acute retinitis, that it sometimes passes with medical men who have not studied the diseases of the eye, for phrenitis or brain-fever, the characteristic symptoms of the ophthalmia, from which the affection of all the other parts arises, not being sufficiently prominent to arrest attention.

The pain of the eye now becomes unequal; it is still pulsative, but is attended by a feeling of cold and weight in the part. Shiverings take place, and there suddenly appears a quantity of pus at the bottom of the anterior chamber. The matter presents a horizontal surface, and is sometimes seen to change its position, on the head being moved from side to side. It constantly increases in quantity till it not only reaches the pupil, but at length fairly fills the anterior chamber. It may accumulate to such a degree, especially in neglected cases, that the cornea projects, assumes the appearance of an abscess ready to burst, and at last gives way under insufferable pain. In some instances, the matter formed within the eye makes its way through the sclerotica, leaving the cornea and anterior chamber entire. After the matter is evacuated, the eye collapses, and the pain gradually subsides.

If the pupil has not completely closed by the end of the first stage, we see, just at the moment when the hypopium begins to form, fine whitish filaments of lymph shooting from the edge of the pupil towards its centre. Viewed through a good lens, these have the appearance of a delicate cobweb. After the pus has covered the pupil, and remained perhaps long unabsorbed, this cobweb-like pseudo-membrane becomes whitish-yellow from little particles of the pus lodging in its interstices, and sometimes a single piece of what appears to be thickened purulent matter, attached to this membrane, projects through the pupil, intimately connected also with the pupillary edge of the iris. This is seen after the greater part of the purulent effusion is absorbed; but if the pupil has closed com-

pletely in the first stage, of course nothing of this spurious cataract is observed.

Retinitis does not necessarily go the length of suppuration. It may be arrested after the pupil has closed, and the retina become insensible. In this case, the eye falls into the varicose state, and ultimately becomes atrophic.

Causes. Retinitis, ending in general ophthalmitis, and arising from causes of very limited and transient action, is rare; yet it occasionally occurs, especially after long-continued straining of the sight in the examination of very small, perhaps microscopical, objects, under a strong light, reflected into the eye, either immediately from the object of examination, or from a speculum. In such cases, however, there are commonly certain predisposing causes, which ought not to escape observation; such as plethora in and near the organ of vision.

Vivid flashes of lightning sometimes excite inflammation of the retina, which has also frequently been brought on by imprudently viewing an eclipse of the sun. Prisoners long confined to the darkness of a dungeon, have been seized with inflammation of the retina on being brought suddenly forth into the full glare of day. Travelling over a tract of country covered with snow has been known to produce the same effect. Saint-Yves notices the case of a man who became blind in consequence of going too close to the light and heat of a strong fire, in attempting to tie a string to a fowl turning on the spit; and another of a workman in the mint, who lost his sight from the brilliant flashing to which he was exposed, while pouring metal into a red-hot crucible. Both of these accidents were probably owing to retinitis.

Blinding persons by producing retinitis was, and still is, in some countries, a mode of punishment. The person is compelled to look steadily on a concave mirror of polished steel, held opposite to the sun. This will excite speedy inflammation of the retina, and certainly end in a greater or less degree of insensibility to light. Some such method must be employed in India at this day, as many of the native princes, who have been condemned to the loss of sight by the jealousy of their rivals, but are suffered to live in a state of captivity, are said to have no appearance, at a little distance, of being blind.

Prognosis. The prognosis in retinitis is not unfavourable, if a proper method of treatment be commenced before the pupil is much contracted, or the power of vision greatly lessened. If vision seems already extinguished, the prognosis is extremely unfavourable. Beer, indeed, had in two cases seen vision return on the arrest of the inflammatory symptoms, but in both a very considerable weakness of sight remained during life, and the patients could read large print with much difficulty, and small print not at all. If the pupil be once closed, even before the retina appears to have become insensible, there is no longer any hope of preserving sight; for even should the pupil re-open in some degree, as it occasionally does on

the inflammatory symptoms being arrested, yet it remains small and motionless, and the eye is still blind.

In the second stage, the prognosis is always bad; for before the disease has advanced so far, vision is irretrievably lost. If this disease has been misunderstood at the commencement or mistreated, so that it has gone on to a complete ophthalmitis, attended with chemosis, there is much danger that in the second stage not even the form of the eye will be saved.

Treatment. Complete rest of the eyes and of the whole body, darkness, abstinence, and active depletion, followed by the rapid introduction of mercury into the system, are the means to be depended upon in the *first stage* of retinitis.

Copious blood-letting from the arm is to be immediately followed by a plentiful application of leeches round the eye. Should the pain of the eye and head still continue, the jugular vein or temporal artery ought to be opened, and an additional quantity of blood abstracted.

Calomel with opium ought to be given in frequent doses, till the mouth is affected.

Belladonna is to be applied in the usual way.

In the *second* and *third stages*, the preservation of sight is out of the question. A warm emollient poultice is to be laid over the eyelids. If only a small quantity of matter be present in the anterior chamber, we must on no account let ourselves be induced to open the cornea; but trust to the sorbefacient effect of the mercury, assisted by blisters behind the ears or on the back of the neck. Beer recommends the eye in that state to be touched repeatedly in the course of the day with vinum opii, by the careful use of which, in combination with the internal employment of opium and sometimes of cinchona, he had seen collections of pus in the anterior chamber completely disappear. Should the hypopium increase, so that the anterior chamber is filled, we cannot trust to its absorption, but must give exit to the matter by opening the cornea with the extraction-knife. In such circumstances, the natural appearance of the cornea and iris is completely lost, the eyeball sometimes remaining flattened in the situation of the cornea, while in other cases it becomes staphylomatous. When the matter accumulates deep in the eye, it is to be evacuated by an incision through the sclerotica, parallel to, and a little behind, the edge of the cornea.

§ 2. *Chronic Retinitis.*

Chronic cases of retinitis not unfrequently present themselves to our observation, under the designation of *weakness of sight*, and are generally characterized by a morbid sensibility to light, muscæ volitantes, ocular spectra, slight obscurity of vision, dryness of the eyes and Schneiderian membrane, followed after a time by gradual contraction of the pupil, and immobility of the iris. Increased sensibility of the fifth pair sometimes attends this disease. The least touch about the eye is painful, and continues to be felt for a

long time. The patient seeks the dark, but there he keeps the eyes shaded and open, whereas in the photophobia which attends conjunctivitis, the eyelids are generally kept shut even in the dark. This circumstance affords ground for diagnosis.

Watchmakers, jewellers, and those who spend great part of the day and night in reading and writing, are apt to be affected in this way; also tailors, milliners, mathematical instrument makers, printers, and engravers, with many other classes in whom the eyes are excessively fatigued. Those who habituate themselves to daily indulgence in ardent spirits are also frequently affected with chronic retinitis. Onanism also seems to induce it.

The Esquimaux, who inhabit Hudson's Bay, are well aware of the loss of vision which arises from exposing the eyes to the constant view of a country covered with snow. They make use of a kind of preservers, which they term snow-eyes. These consist of two pieces of wood or ivory, so formed as to fit the eyes, which they completely cover, and are fastened behind the head. Each piece presents a narrow slit, through which every thing is distinctly seen. This invention preserves them from the snow-blindness, which is apt to be occasioned by the strong reflection of the sun's rays; and which, it is probable, is the effect of slow inflammation excited in the retina.[1]

Treatment. Cases of this disease are often injured by stimulant and tonic treatment, while, on the other hand, they are greatly benefited by moderate and repeated depletion. A gentle course of mercury is also of use. Counter-irritants sometimes seem hurtful. The eyes must be spared, and the patient should try the effects of country air and exercise.

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[1] These instruments also increase the powers of vision, so that the Esquimaux, when desirous of viewing any thing at a distance, mechanically apply them to their eyes. Different accounts are given of the slit or slits in these instruments, for some tell us there is only one in each eye-piece, and that it is long and narrow, while others say that there are two, about a quarter of an inch long. This is probably regulated by the fancy of the wearer.

SECTION XXVI.—AQUO-CAPSULITIS.[1]

By *aquo-capsulitis* is meant inflammation of the membrane, generally considered as serous, which lines the internal surface of the cornea, and is prolonged, though much modified, over the anterior surface of the iris.

We sometimes meet with this ophthalmia in the acute form, when it is attended with very considerable redness of the sclerotica and conjunctiva; fully as often in the chronic, of which a peculiar sort of opacity of the cornea is the most remarkable symptom.

1. In the acute form, aquo-capsulitis looks like a partial rheuma-

tic ophthalmia, the redness consisting chiefly in an incomplete sclerotic zone, sometimes pretty intense. The conjunctival vessels are also frequently enlarged, and it is stated that sometimes one or more distinct blood-vessels may be discovered traversing the inflamed membrane.

2. The external surface of the cornea is at first perfectly clear and glancing, but its lining membrane soon appears more or less dim or opaque. There is at the same time a muddiness in the anterior chamber, and occasionally an appearance as if the eyeball were unusually full and prominent. This arises from an increase in the quantity of the aqueous humour, the balance of action being suspended, which naturally exists between the exhalents and absorbents of that fluid. In more severe cases, coagulable lymph is effused from the lining membrane of the cornea, and if the iris be at the same time in an inflamed state, this effusion may become the medium of adhesion between the iris and the cornea. More frequently, however, the iris becomes tagged to the crystalline capsule.

Besides the diffused muddiness, there are often present in this disease, and especially in its chronic stage, one or more circumscribed milk-like spots on the internal surface of the cornea, which even the least experienced may readily distinguish from any of the common superficial opacities of that part. The spots in question give the cornea a mottled appearance, and form by far the most characteristic mark of this ophthalmia. Mr Wardrop has accurately described their more opaque central points as surrounded by a kind of disk, resembling what is called the eye of a pebble. He seems to ascribe the whiter point in the centre to opacity of the substance of the cornea, and the disk to that of the lining membrane.

This mottled appearance I have seen very distinctly in several cases. What was very remarkable, in one of these the spots appeared and disappeared, even in the space of a few hours, so that the patient saw worse in the morning when most of the spots were observed, and better towards the evening when those at the upper part of the cornea had greatly diminished. In this case, there was a general turbidness observable in the morning. The whole appearance of the anterior chamber, and of the spots in question, resembled very much the effect which might be supposed to be produced, were a quantity of minute drops of ammoniated oil mingled with the aqueous humour. This state of the cornea was the consequence of pretty severe inflammation, about nine months before, in a patient who had long been troubled with rheumatism.

3. During the continuance of the inflammatory symptoms, there is generally so much muddiness diffused over the whole anterior chamber, that no distinct portions of effused lymph can be distinguished, unless they be of large size; but when this turbid state goes off, flakes of lymph may sometimes be perceived, and in other instances, the whole surface of the inflamed membrane is left covered by a thin layer of it. In some cases, the effused lymph floats in the anterior chamber, appearing like a thick cloud; in other cases, it

is deposited in streaks, so as to present a reticulated appearance; and in others, it resembles a purulent fluid.

4. There sometimes attends this disease an increased flow of tears, but the patient in general does not suffer much from exposure to light. What is particularly to be noted, is a sensation of distention and fulness in the eyeball, accompanied with a dull aching pain, generally in the forehead, sometimes also in the back part of the head; symptoms which Mr Wardrop assures us are instantly and permanently relieved by evacuating the aqueous humour. In some cases, the pain is severe, pulsative, circumorbital, and nocturnal.

5. The constitutional symptoms vary much in their degree of severity. Sometimes the pulse is very frequent and hard, the skin hot and dry, the tongue loaded, and the functions of the alimentary canal disordered. In other cases, the disease almost from the commencement, assumes a chronic form, and after continuing a certain period, participates in any peculiarity of the patient's constitution, and becomes thereby modified.

If the effused lymph be not afterwards absorbed, it is apt to become organized; and not unfrequently red vessels can be seen ramifying through it. This is a much more frequent appearance than that to which I have already referred, of a red vessel or vessels running along the internal surface of the cornea without any effusion of lymph.

Causes. Long-continued over-exertion of the eyes, and suppressed perspiration, are causes, to which I have traced this disease.

Treatment. In the acute stage, I have found the treatment for iritis completely successful; viz. depletion, mercury, and belladonna.

Emetics and nauseants, purgatives, and counter-irritation, have been recommended, and in some instances a cure has been effected by these means, without the use of mercury.[2]

In the cases recorded by Mr Wardrop, in the fourth volume of the Medico-Chirurgical Transactions, benefit appears to have been derived from cupping the temples, purging, fomenting, and the application of such stimulants as murias and nitras hydrargyri in solution, red precipitate salve, and sulphuric ether. Mr Wardrop, however, places most reliance on the evacuation of the aqueous humour, stating that there is no inflammation of the eye, in which so much benefit is derived from that operation, as when the disease affects the internal layer of the cornea. He had never found it fail in procuring immediate relief of the pain of the head, and instantaneous restoration of the transparency of the anterior chamber.

It is probable that a variety of other remedies besides those above mentioned, might be useful in aquo-capsulitis. Cinchona internally, and vinum opii externally, are likely to do good in the chronic stage.

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[1] *Inflammatio tunicæ humoris aquei.*

[2] Praël, in Ammon's Zeitschrift für die Ophthalmologie; Vol. iii. p. 42; Dresden, 1833.

SECTION XXVII.—INFLAMMATION OF THE CRYSTALLINE CAPSULE AND LENS.

Common lenticular cataract appears to be a consequence of the impeded nutrition which attends the advanced period of life; while opacities of the capsule are probably in all instances the result of inflammation, and thus resemble specks of the cornea. Capsular and capsulo-lenticular cataracts generally present themselves to our observation after the inflammation in which they have originated has subsided; but in other cases we may be fortunate enough to meet with the disease in its acute stage. The appearances which are then presented to observation, have been minutely described by Professor Walther,[1] and from numerous opportunities, I am enabled to verify, to a certain extent, the accuracy of his description.

He states that inflammation of the crystalline capsule generally occurs about the middle of life, and in subjects of a slight cachectic disposition. This is certainly true, although in more than one instance I have seen such severe inflammation of the capsule in young children, that the part appeared to the naked eye completely loaded with red vessels, a state not unfrequently observed in the horse,[2] but which I have never seen in the adult human subject.

The anterior hemisphere of the crystalline capsule, deriving its blood-vessels from the arteries of the ciliary processes, while the posterior is nourished by the artery of the vitreous humour which is a branch of the central artery of the retina, is frequently met with in a state of inflammation, while the posterior seems free from disease.

1. *Inflammation of the anterior hemisphere of the capsule* occurs oftener in light eyes than dark, and is always accompanied by a slight change in the colour of the iris and form of the pupil, the iris becoming a little darker, and the pupil irregular. The motions of the iris are at first lively and extensive, but subsequently become sluggish and very limited. The pupil is generally smaller than in the sound state, but sometimes it is irregularly dilated. There usually appears a black rim of irregular breadth all round its edge, arising from the pigmentum nigrum of the posterior surface of the iris coming into view.

Along with these symptoms, a number of red vessels appear in the pupil itself, the largest of which are in some instances visible to the naked eye, but the greater number distinguishable only by the aid of a magnifying glass. What at first merely appears a red point, assumes under the glass, the appearance of a delicate tissue of vessels. The lens used for this microscopical examination of the eye should be one of a very short focus, and the patient should be so placed with respect to the light that the parts within the pupil be well illuminated, and not shaded by the glass, nor by the head of the observer. In order to have the pupil as large as possible, a little of a filtered solution of extract of belladonna in water may be dropped upon the affected eye an hour previously, and the other

eye should be closed during the examination. In this ophthalmia, the sensibility not being much increased, the patient can bear examination of the eye in a strong light and with a dilated pupil, without much uneasiness.

The red vessels in *inflammation of the anterior hemisphere of the capsule*, always constitute a sort of vascular wreath, observed at about a quarter of a line's distance from the pupillary edge of the iris; this wreath forms a concentric circle within the pupil, and is found on examination to consist, not of one or a few vessels circularly disposed, but of a number of vascular arches. (*Fig.* 55 shows a magnified view of the appearances.) To this vascular wreath there run in a radiated form, numerous vessels from the circumference of the capsule. Other vessels seem to extend from the delicate membrane retaining the pigment of the iris in its place; but such are not constantly present. It is only in cases where the disease has lasted some considerable time that they appear. In other cases, according to Professor Walther, vessels seem to be prolonged rather from the capsule into the posterior surface of the iris. Those which run from the iris to the capsule, never arise from the edge of the pupil, but at a little distance from it, on the posterior surface of the iris, so that nearly a line's breadth next the pupillary edge is free from these vascular sproutings.

Fig. 55.

From the vascular wreath already mentioned, vessels are seen spreading towards the centre of the anterior capsule, and there again forming clusters and arches. Although the continuation between the vessels, seen in different parts of the pupil, seems interrupted at some points, yet there can be no doubt of their being continuous. From their extremely minute size they can be distinguished only where enlarged and clustering together.

2. *Inflammation of the posterior hemisphere of the crystalline capsule* is a much rarer disease than that of the anterior. It is easily recognised by the deep situation of the opacity which it presents, and the stellated arrangement of the enlarged vessels. Both hemispheres of the capsule may be inflamed, in which case behind the red vessels, seen in the anterior capsule, there appears a network of more delicate vessels, which seem to be seated in the lens itself. The larger trunks of this network evidently come, says Professor Walther, from its posterior surface, directly forwards, and then divide into branches. (*Fig.* 56 shows a magnified view of the appearances.) There can be no doubt that these are the ramifications of the central artery of the vitreous humour, spread out upon the posterior capsule.

Fig. 56.

3. As *the lens* undoubtedly derives its nourishment from the capsule, it is not to be wondered at, that when the latter is inflamed, enlarged vessels should be seen prolonged into the former. Professor Walther, however, is of opinion that the existence of vessels passing into the substance of the lens is entirely morbid, and he

compares it to what occurs in inflammation of the thorax, when vessels are prolonged from the pleura to the pseudo-membrane formed on its surface. He says, that as the vessels of the anterior hemisphere of the capsule shoot forwards into the posterior surface of the iris, so they shoot backwards into the lens itself; and that the same holds good with respect to the posterior hemisphere of the capsule, which being more copiously supplied with blood-vessels, it is explained how the largest vessels of the inflamed lens are seen to come from behind forwards. It would appear also that all inflammations of the lens begin in the capsule, a fact which Walther considers as analogous to the spread of inflammation from the ciliary processes or from the iris to the capsule.

At the apparent terminations of several of the vessels in the capsule, there are distinctly perceived little knots of a whitish-grey semi-transparent substance. This is evidently coagulable lymph, and Walther considers its presence as disclosing the manner in which inflammation of the capsule and lens produces opacity of these parts. The anterior hemisphere of the capsule, where the vessels are very numerous, sometimes assumes a peculiar velvety or flocculent appearance, and in one or more spots of its extent presents a grey or brownish colour. These brownish spots appear in some instances to be nothing more than effused lymph; but in other cases they probably owe their origin to the iris having been united to the capsule by partial adhesions, which being separated either by more extensive spontaneous motion of the iris, by mechanical violence, or by the sudden influence of belladonna or some similar narcotic, part of the pigment of the iris has remained adherent to the anterior surface of the capsule.

It is a fact, strongly confirming the accuracy of Professor Walther's account of inflammation of the crystalline capsule, that in anterior capsular cataract, the specks or streaks generally radiate from the edge of the anterior hemisphere of the capsule towards its centre; while in posterior capsular cataract, they evidently branch out from the centre of the posterior hemisphere,[3] following thus both the natural course of the arteries, and the directions of the inflamed vessels as represented by Professor Walther.

As to the state of the patient's vision who is affected with inflammation of the lens and capsule, it is indistinct and confused, where the disease is severe, particularly when the eye is directed towards distant objects. Near objects are seen as if through a fine gauze. This does not seem red, nor are objects tinged of that colour.

This ophthalmia always observes a chronic course. It proceeds very slowly, and is attended with little or no pain. When pain does attend this disease, it is seated at the bottom of the orbit, in the forehead, or in the crown of the head. When the disease has continued for some considerable time, the blood-vessels in the lens and capsule become varicose and remain so permanently. Walther observed the vessels of the lens in a middle-aged man, to remain in a varicose state for a whole year, without undergoing the least al-

teration. I have seen this disease followed or accompanied by incomplete amaurosis, complicated in one case with tremulous iris. Effusion of fluid between the lens and capsule, and dissolution of the former, are not unfrequent consequences of inflammation of these parts; while in other instances, the disease would appear to go the length of suppuration, for we must consider inflammation as the cause of that variety of cataract which is called *cataracta cum bursa ichorem continente*, the opaque state of the lens and capsule being complicated with the presence of a cyst contained within the capsule and filled with pus.

The causes of this ophthalmia have not been sufficiently investigated. In one case which came under my care, it affected the right eye of a keen sportsman, and might perhaps have been connected with the over-excitement which the eye must have undergone year after year at the shooting season.

Inflammation of the lens and capsule approaches nearer to iritis than to any other ophthalmia. It is, however, much less acute in its character, and greatly less under the influence of treatment.

Treatment. Depletion, counter-irritation, and alteratives, are the remedies which suggest themselves as most likely to do good in the early stage of this disease, and tonics in the latter stages. In the acute stage, I have sometimes succeeded completely in curing inflammation of the anterior hemisphere of the capsule. In a case which I treated lately, on the first day of my being called, two minute reddish spots were seen projecting from behind the edge of the pupil. Next day, there were five. In the course of a week, the symptoms totally disappeared, under the employment of venesection, leeches, calomel with opium, and belladonna. The mouth was made very sore. In the chronic stage, however, I must confess that this ophthalmia has in my hands proved one of the most obstinate. Cases, generally mistaken and treated for iritis, have been sent to me for consultation, in which a long-continued use of various remedies, including mercury, had been productive of no effect.

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[1] Abhandlungen aus dem Gebiete der practischen Medicin; Vol. i. p. 53; Landshut, 1810.

[2] Leblanc, Traité des Maladies des Yeux observées sur les principaux Animaux Domestiques, p. 409; Paris, 1824.

[3] Medico-Chirurgical Transactions; Vol. iv. Pl. ii. Fig. 9; London, 1813.

SECTION XXVIII.—INFLAMMATION OF THE HYALOID MEMBRANE.

The morbid states in which the vitreous humour is occasionally found, such as synchesis or dissolution, dropsical increase, atrophy, unnatural viscidity, change of colour, loss of transparency, and ossification, lead us to regard the hyaloid membrane as susceptible of inflammation. A still more convincing proof is, that the vitreous

body is sometimes met with, on dissection, infiltrated with purulent matter. The vessels of the posterior hemisphere of the crystalline capsule are derived from the central artery of the vitreous humour, and we can scarcely suppose the capsule to be concerned in inflammation, without the hyaloid, at the same time, participating in the disease.

I had under my care, at the Glasgow Eye Infirmary, a young man with incomplete amaurosis in each eye. His vision had failed suddenly about two years before. At that time, it was subject to frequent alternations, becoming suddenly diminished, and as suddenly regaining its usual acuteness. He complained of headach, with painful sensations over the body. He was troubled with red spectra before the left eye, but not before the right. The left eye was presbyopic, but with the right eye he perceived near objects more distinctly than distant ones. Deep in the right vitreous humour, a spotted opaque appearance was observed. On dilating the pupil by belladonna, it was evident that there were two sets of opacities behind the lens. One, consisting of a central spot with numerous opaque threads radiating from it, especially downwards and outwards, was situated exactly in the axis of the eye, and a little way behind the lens. The other opaque spot was much deeper in the eye, without any radii, and evidently moved up and down when the patient moved his eye. Each pupil possessed considerable power of motion, and there was no tremulousness of either iris. I considered the appearances in the right eye as indicative of inflammation of the hyaloid. In two subsequent cases, I have seen similar appearances. In one of these, I discovered what I considered the effects of hyaloiditis, on directing the light of a gas jet through the pupil with a lens.

Ammon has remarked that opacity of the posterior wall of the capsule is very frequently the precursor of disease of the vitreous body and of the retina, or is a consequence of it. This he supposes depends on a diseased action of the central artery, perhaps also on a morbid change in this delicate vessel itself.[1]

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[1] Ammon's Zeitschrift für die Ophthalmologie; Vol. iii. p. 469; Dresden, 1833.

SECTION XXIX.—PHLEBITIC OPHTHALMITIS.

We substitute the term *ophthalmitis* in place of ophthalmia, when an inflammatory disease of the eye is so extensive, as to affect almost all its textures.

Phlebitic ophthalmitis has been observed under a variety of circumstances. It is a consequence of suppurative inflammation in

some part of the venous system, and this may be excited in different ways.

1. Inflammation of a distant vein, produced by a wound, or by tying the vein, has been followed by the usual constitutional disturbance attendant on phlebitis, and amongst other secondary effects, by disorganizing inflammation of the eye.

2. Suppurative inflammation of the uterine branches of the hypogastric veins, in puerperal women, which spreading to the iliac and femoral veins, is apt to cause phlegmasia dolens, sometimes produces phlebitic ophthalmitis.

3. Phlebitis occurring in erysipelas, or diffuse cellular inflammation, has been known to terminate in phlegmonous ophthalmitis.

4. Phlebitis arising in the course of febrile diseases has ended in the same result.

I have little doubt that this termination follows in other cases of phlebitis; but the subject is comparatively a new one, and much remains to be done for its complete elucidation. In some of the cases I am about to quote, no marks of phlebitis may have been detected on dissection, and yet there can scarcely be a doubt that the cases were of phlebitic origin. In all cases of ophthalmitis arising without direct injury, we should suspect this cause. We should examine carefully the different limbs, in order that if there be any swelling, hardness, or pain, in any of the external veins, we may detect it. We should ascertain also the state of the general health, and the history of the patient's previous ailments, so that if phlebitis had preceded the affection of the eye, we may not remain ignorant of so important a circumstance. In fatal cases of ophthalmitis, the venous system should undergo the most careful scrutiny, when the dead body comes to be examined.

1. The two following cases are illustrations of phlebitic ophthalmitis, resulting from wounds of veins.

Case 222.—Mr Earle removed a portion of a varicose vein of the leg. This was followed by great constitutional disturbance, inflammation of the vein, deep-seated abscesses in the opposite leg, in both forearms, and in one of the lungs. The day before the patient's death, the corneæ were observed to have become opaque, and their surface rough, the vessels of the conjunctivæ were injected, and the patient lay with his eyes constantly closed. On dissection, destructive changes were found to have taken place within the globe of the right eye, the crystalline lens was so soft as to yield to the slightest touch, the vitreous humour was of a reddish-yellow colour, and red vessels were distinctly seen traversing its membrane. The retina was of a deep red colour. The nerve of the third pair on the left side was evidently flattened, and softer than that on the right. The nerve of the fifth pair on the right side had undergone a similar change to a greater extent.[1]

Case 223.—A young man had a ligature placed on the left carotid artery, for an aneurismal disease of one of its branches. Considerable difficulty was experienced in passing the needle round the vessel. Venous hæmorrhage took place during the operation, recurred at night, and occasionally afterwards, for nine or ten days. On the fifth day after the operation, the patient had a severe rigor, succeeded by heat of skin, and general febrile symptoms. These increased, the pulse rose to 120, and the constitutional disturbance assumed a very violent character. About the 10th day, the vision of the left eye became impaired, and was quickly lost, the pupil was contracted, the iris immovable, and the cornea had

a somewhat hazy appearance; effusion took place under the conjunctiva, and the lids were greatly swoln, producing an appearance as if the globes were much protruded. There was, at the same time, a degree of deafness, considerable stupor, and occasionally slight delirium. In the course of a few days, the coats of the eye sloughed at the upper part, and its contents were evacuated.

While these changes were going on in the eye, collections of matter formed, without pain, in different parts of the body, on both shoulders above the insertion of the deltoid muscles, over the sacrum, &c. The constitutional disturbance abated, and the collapsed eye healed over; but the patient never recovered his health. He died five months after, labouring under lumbar abscess, and worn out by hectic. On examination of the body, a portion of the jugular vein, to the extent of 2 inches, was found wanting; the upper and lower ends next the lost part being shrunk, ligamentous, and gradually lost in the cellular substance. On opening the head, pus was found effused in great quantity between the tunica arachnoidea and pia mater, along the base of the brain, and the whole length of the spinal cord. The intermuscular cellular substance of the loins was loaded with pus.

Mr Arnott, in his valuable paper[2] on the Secondary Effects of Inflammation of the Veins, asks, whether, when we consider the circumstances of this case, the venous hæmorrhage, constitutional disturbance, formation of abscesses, and appearances presented on dissection, and compare them with the consequences which have been observed to follow inflammation and suppuration of a vein, and the occurrences in Mr Earle's case, we can doubt that the affection of the eye arose from the inflammation of the jugular vein, and from the entrance of an inflammatory secretion, probably pus, into the blood.

2. A disease of the eye, similar to that observed in the two cases above quoted, occurring in the puerperal state, has been described by Dr Hall and Mr Higginbottom,[3] under the title of "Cases of Destructive Inflammation of the Eye, and of Suppurative Inflammation of the Integuments, occurring in the Puerperal State, and apparently from Constitutional Causes." In all of these cases, six in number, the affection of the eye took place in from five to eleven days after delivery. It was preceded and accompanied by serious indisposition, in every instance terminating fatally, and under symptoms of extreme exhaustion.

The affection of the eye was characterized by redness of the conjunctiva, intolerance of light, and contracted pupil, rapidly followed by opacity of the cornea, and excessive chemosis. In two of the cases, the coats of the eye gave way; and in one of these, where the process was observed, the rupture took place by ulceration of the coats round the cornea. In both of these cases, the collapsed globe had healed over previously to death. In each instance only one eye was affected, and in five of them it was the left. In the case communicated by Mr Ward, it does not appear which eye was the seat of the disease.

With the disease of the eye, there also took place an inflammation of the integuments, first observed on the hand, but on careful examination, found in the inferior, as well as the superior extremities, and under which, matter quickly formed. In one case only, there was no such inflammation. The authors of the paper con-

jecture, that the morbid affection of the eye had a constitutional origin. No examination after death seems to have been made in any of the cases.

In his comments on these cases, Mr Arnott seems to think, that, considering the circumstances under which the affection of the eye took place, its characters, and the depositions of pus under the integuments of the body, and comparing these with the known consequences of inflammation of veins, and the frequency of inflammation in the veins of the uterus after parturition, we may be justified in attributing the disease of the eye to inflammation of the uterine veins, and the introduction of pus into the circulation.

I owe to Dr James Brown, the opportunity of seeing a case of *puerperal ophthalmitis*, which I have no doubt was of the nature of the cases recorded by Dr Hall and Mr Higginbottom.

Case 224.—The patient was a slender scrofulous woman, about 30 years of age, of irritable temperament, sedentary habits, and melancholy disposition. She had been seven times pregnant, and the following numbers indicate the months during which each utero-gestation was continued; viz. 9, 7, 5, 9, 9, 7, 4. She had formerly been subject to discharge from the vagina, probably leucorrhœal, but not immediately before the abortion of the fourth month, which led to her last illness. There was nothing remarkable about the labour. The lochial discharge was scanty, and did not continue above a week, at the end of which time she began to complain of pain in the back and groins, accompanied with slight colds and heats, and little, if at all, relieved by blood-letting and purging, both of which were copiously used. Some 15 or 18 days after delivery, she was seized with very severe rigors, followed by great pain in the head, back, and abdomen; the pain in the abdomen being complained of chiefly on pressure.

The affection of the eye, which, as in the cases already referred to, was the left, came on about 28 or 30 days after the former symptoms had been *apparently* subdued by the usual means, although during all this time, the general state of the patient had been by no means favourable. The affection of the eye was ushered in by new rigors, which were followed by a good deal of fever, rather of a remittent type, and occasional feelings of sinking. The pulse continued from the first, quick, irritated, and by no means strong. The eye was highly inflamed, the conjunctiva much chemosed, the lids swoln, and the lower lid everted. There was severe pain in the eye and head, and excessive intolerance of light, so much so that she was obliged to keep her face covered with a handkerchief, although the window-shutters were kept constantly closed. At first tears ran from the eye, and, after a time, purulent matter. The cornea became opaque, but the eye did not burst.

Her mind was all along very desponding. For some days she was slightly incoherent on coming out of sleep, but when roused was sensible to the last. No abscess formed near the surface of any part of the body. She died about eight weeks after the abortion. It is to be regretted that neither the eye nor the body was permitted to be examined.

Case 225.—Dr Graves relates a case of fatal phlegmasia dolens, after parturition, in which one of the eyes was affected. In addition to the phlegmasia dolens, the patient had inflammation of the mucous membrane of the intestinal canal and lungs. She laboured under fever, vomiting, and irritability of the stomach; she had severe diarrhœa, tympanitis, and a swoln state of the abdomen, with turgescence of the veins on its surface, so as to bear some resemblance to dropsy. She had a constant bronchitic cough; and in fact, a combination of unfavourable symptoms, which rendered her case hopeless.

In the course of her illness, she awoke one morning with intense pain in the eyeball, and complete blindness of the affected eye, being unable to distinguish light from darkness. On examination, there was immense serous chemosis discovered, so great in fact, as almost to conceal the cornea, which appeared, as it

were sunk and buried in it. This chemosis was so exquisitely tender, that she could not bear the eyelids to be touched. Nevertheless, it presented a character totally distinct from any other species of acute chemosis, its colour being almost white. The exceedingly small portion of cornea which was visible appeared to be opaque. These symptoms continued with undiminished intensity to the period of her decease.

Inspection. No serum was discovered in the pleural cavities, but there was a considerable quantity in the pericardium. The left pleura was adherent at all points. The lungs were healthy, with the exception of some œdema posteriorly; the bronchi contained a quantity of sanguinolent frothy fluid. The liver was large and much congested; the spleen large, soft, and almost pulpy. The uterus exhibited nothing remarkable, except the loaded state of the spermatic veins, which were very large and tortuous. The veins of the mesentery were also congested. The vena cava inferior was healthy as far down as its junction with the renal vein, below which it was thickened, and filled with a fibrinous substance, varying in its consistence, and adhering to the inner coat of the vessel. On laying bare the femoral vein, the subcutaneous cellular tissue was found to be infiltrated with serum, the granules of fat much firmer and more distinct than natural, and the intervening cellular membrane thickened and opaque. The superficial fascia was dense, white, and of a flaky appearance, the lymphatic glands in the groin were large, full of serum, and closely matted together by condensed cellular tissue. It was extremely difficult to detach the iliac, femoral, and saphena veins, in consequence of their strong adhesions to their sheath, and the surrounding organized lymph in which they were imbedded. These, together with the popliteal vein, were in a similar condition with the inferior cava, except that the substance they contained was thinner, of a brown colour, and somewhat purulent appearance.

On examining the eye, the cornea was found to be perfectly transparent, and the chemosis to have nearly disappeared. The iris had lost its natural grey colour and become nearly white, and its surface was covered with long flakes of lymph, both anteriorly and posteriorly. The aqueous humour was turbid, and had portions of curdy lymph floating in it. The crystalline lens was opaque, and of a light brownish tint. The vitreous humour was of a dull yellowish colour, and had its consistence altered, for, on opening it, the fluid which dropped out was thick and ropy.[4]

3. In the following case, both eyes appeared to be affected with phlebitic ophthalmitis, in consequence of diffuse cellular inflammation of the forearm.

Case 226.—Mrs L. aged 60, previously very healthy, became affected with whitloe at the point of the index finger of the right hand, about the end of November 1837. She said she had pricked the finger, and that it had afterwards been "poisoned." She described the pain as shooting occasionally from the finger towards the shoulder. The finger was laid open, and a few drops of pus were discharged. In the course of a few days, it was apparent that pus was lodged in the sheath of the flexor tendon, which was opened. This was soon followed by erysipelas over the whole forearm, ending in extensive suppuration. The forearm continued in a bad state for more than five weeks. It was repeatedly punctured, and disorganized cellular membrane was discharged by numerous orifices.

About the middle of January 1838, she began to complain of rheumatic pains in several of her joints, but without any swelling. She had never been subject to rheumatism, nor to synovitis. A few days after this occurrence, the erysipelas suddenly subsided, and she began to complain of dimness of sight, but without any pain in the eyes. The iris of each eye appeared inflamed, and the pupils were somewhat contracted and very hazy. In three or four days from the commencement of this affection of the eyes, there was a deposition of lymph observable at the lower part of each anterior chamber.

I visited Mrs L. along with Mr Maxwell and Mr Moffat, on the 26th of January. Both eyes were almost completely amaurotic. The capsule of each lens was opaque and of a greenish hue. The pupils were irregular and contracted. These symptoms denoted the existence of inflammation; but their supervention had been unattended with pain, and in this respect the case differed from ordi-

nary instances of iritis. Calomel and opium were given, so as to make the gums sore in a few days; leeches and blisters were applied; and extract of belladonna was used externally.

On the 6th February, nine days from the time when the sight became impaired, the left eye was greatly protruded, and the conjunctiva so much chemosed as to overlap the greater part of the cornea. The swelling was of a pale red colour, and covered with a gelatinous, or lymphatic, pretty firm, exudation, which peeled off in the form of a membrane. The eyeball was very tense. I punctured it with a lancet, through the sclerotica.

In about a week, the swelling had fallen, so that the eye retreated into its socket, and presented its natural size, but the rheumatic pains became much aggravated for several weeks. Vinum colchici, external rubefacients, &c. were liberally used, with little apparent benefit.

About the beginning of April, the right eyeball became protruded, in a similar way as the left had been two months before, but not to the same extent. It subsided in about the same time, under soothing applications. The left eye afterwards became atrophic. Both remained totally amaurotic.

In the months of June and July, the rheumatic affection abated considerably, and the general health improved, but the patient felt so much weakness in her back, that she could not walk without assistance. Several of the lumbar vertebræ appeared a little protruded.

In this case, there were strong grounds for believing that the disease of the eyes was the consequence of some morbid poison, generated during the attack of diffuse cellular inflammation, and conveyed through the body by means of the circulation. A remarkable circumstance was the length of time, which elapsed between the protrusion of the one eye and that of the other.

4. The train of events in the following case was scarlatina, phlegmasia dolens, typhus fever, phlebitic ophthalmitis, and death.

Case 227.—Stewart Bell, a weaver, aged 23, was admitted into the Glasgow Fever Hospital, on the 14th May 1836, for scarlatina, and was dismissed cured in the course of a few days. He was re-admitted on the 1st June. At his readmission, he complained of acute pain in the left thigh and leg, much increased by pressure on the inner part of the thigh. Both the leg and thigh were swoln, out of their natural colour. The left arm was rigid, but not swoln, and pressure or motion produced slight uneasiness. He complained of pain in the joints. Pulse 112, pretty firm. Tongue furred, moist. Bowels loose. It was the impression of Dr Cowan, whose patient he was, that he was affected with phlegmasia dolens from phlebitis. He had had several rigors on the 24th May, followed by headach, heat of skin, and urgent thirst; and on the 25th, the affection of the limbs commenced. He was ordered ℥ss. of castor oil, with 25 drops of laudanum; gr. iss. of opium at bedtime; and 12 leeches to the thigh.

2d. Considerably relieved by the leeching. Urine drawn off by the catheter. Thrice a-day 2 grains of calomel with 5 grains of Dover's powder.

5th. Typhoid eruption. Delirium. Œdema of the eyelids to a great degree. Pulse 100. Tongue brown and dry.

7th. Delirium continues. Pulse 100. Tongue much loaded. Bowels slow. Six grains of calomel, with 12 of jalap.

8th. Pulse 120. Powders continued.

9th. Rigidity of both arms. Delirium continues. Pulse 120. Eyes much swoln and protruding. Twelve leeches to head. Powders continued.

10th. Sinking. Pulse 120. Features sharp. During this day, deposition of purulent matter was discovered in both eyes. Died in the evening.

11th. *Inspection.* Dura mater thickened; and in the course of the longitudinal sinus, a small, rough, irregularly-shaped, ossified body, about the size of a split pea, was discovered. Brain softer than natural. Lungs engorged, and bronchi reddened. No disease in stomach or intestines. No trace of pus in the veins. The eyeballs, which had previously been much protruded, had sunk nearly to their ordinary place in the orbits.

Left eye. The cellular and adipose tissue surrounding the eyeball, was indurated, swelled, and infiltrated with serum. The cornea transparent. The sclerotic reddish, soft, and thickened, especially around the entrance of the optic nerve. The anterior chamber contained a reddish fluid, with some white flaky matter. The iris was thin and soft; it had contracted no adhesions. The choroid coat adhered more firmly than usual to the sclerotic; its inner surface presented some reddish spots, interspersed with white patches, apparently of lymph, which could not be detached from it, and seemed incorporated with its substance. The ciliary body was not materially changed. The pigment was in some places entirely deficient, and in others the remains of it could be easily separated from the choroid; no trace of it was found on the posterior surface of the iris, and the slight shreds of it which remained on the ciliary processes were readily removed, so as to leave that structure of a uniform white colour.

The choroid coat was separated from the retina by a considerable quantity of reddish fluid, with whitish puriform flakes, from the entrance of the optic nerve forwards to the zonula Zinnii. It flowed out on penetrating the choroid.

The retina, thus detached from the choroid, was firmly united to the hyaloid membrane, and anteriorly to the zonula Zinnii; so that these textures formed a whitish thickened mass, enclosing a small quantity of a reddish fluid, the remains of the vitreous humour. The membranous laminæ of the vitreous body had entirely disappeared towards its centre. The adhesion and thickening of the retina, zonula Zinnii, and hyaloid, seemed to be from effusion of coagulating lymph. It was most remarkable at the zonula Zinnii, and greater near the entrance of the optic nerve than at the equator of the eye.

The lens and both layers of its capsule were transparent.

Right eye. The appearances were exactly similar, with the following exceptions. 1. There was a thin lamina of lymph lying in the lower part of the anterior chamber, parallel to the iris, and extending up to the pupillary margin. 2. A zone of the retina and hyaloid membrane in the equator of the eye was so slightly thickened, and so transparent, that the reddish fluid in the centre of the vitreous body was distinctly seen through it, when the light was transmitted through the lens. 3. A slight uniform layer of pigment remained on the posterior smooth zone of the ciliary body, and a very distinct layer on the posterior surface of the iris.

Phlebitis, attendant on typhus fever, is no doubt a rare event; but I understand from Dr Cowan, that he has witnessed several cases of it. It generally shows itself about the period of convalescence, and not early in the disease, as it did in Bell. For example, one patient, a man of 25 years of age, was pronounced convalescent on the 15th May, had rigors on the 24th, and died on the 29th. Pus was found in the left femoral vein. In two cases, besides that of Bell, Dr Cowan saw affections of the eyes, probably the result of phlebitis. In one of these cases, the corneæ ulcerated on the day of the patient's death; in the other, there was purulent deposition and ulceration of the corneæ, on the 19th day of the fever.

The appearances of the eyes in the following case were very similar to what I have seen in cases of phlebitic ophthalmitis.

Case 228.—Daniel Maclellan, aged 35 years, was admitted into the Glasgow Eye Infirmary, under the care of Dr Rainy, on the 7th June 1836.

The bulbs of both eyes are of an intense red, much swoln, and projecting far out of the sockets, but still covered with the upper eyelids. The whole cellular membrane round the eye is œdematous; the lower eyelids swoln and everted. The irides have a greenish hue; the pupils are irregular, and are not affected with light. The right pupil is occupied by an opaque lens; the left presents a hazy whiteness. Has no perception of light nor shade with either eye. Thinks he has a very slight perception with left eye. This disease commenced about a fortnight ago, after an attack of severe pain in side of chest, for which he was bled profusely.

ain has been frequently severe in the eyes, and is still occasionally troublesome ove the orbits. Pulse 116, soft. Bowels rather bound. Has been treated with eching, blisters, scarifications, purgatives, and calomel and opium. Eight eches to each eye. Eight grains of calomel and 8 of aloes.

10th. Swelling of left eye greatly diminished, and vision improved. Swelling right continues. Ten leeches to right eye.

12th. Right eye still much inflamed. Leeches repeated to right eye. Pill ntaining 2 grains of calomel and 1 of opium, morning and evening.

13th. The lids were carefully brought together by plaisters, and a compress d bandage applied over the eyes. The swelling of both eyes is much diminished -day. Solution of 4 grains of nitrate of silver in 1 ounce of water. Three of e calomel and opium pills daily.

15th. Mouth a little sore. Two pills daily.

16th. Head to be shaved. Blisters behind ears. Twelve drops of vinum colici at bedtime.

18th. Complains of pain in left eye. Two leeches to left upper eyelid.

22d. Pain in the left eye was relieved on the 20th. On the morning of the st, suddenly became insensible, and expired.

Inspection. The pia mater was rather more vascular than usual. A considerble quantity of serum under the arachnoid, and at the base of the brain.

Right eye. The orbital cellular tissue was infiltrated with serum; it was indurated, and contained a collection of purulent matter, which projected under e conjunctiva, and communicated, by an opening on the under surface of the lerotica, with the interior of the eye. The sclerotica was greatly thickened, d firmly adherent to the indurated cellular tissue around the entrance of the ptic nerve. The choroid adhered firmly by its outer surface. The inner surce of the choroid presented traces of fibrinous effusion, and was completely deached from the retina by a collection of purulent matter, which also extended to the cells of the vitreous body, and communicated with the external abscess hrough the opening in the sclerotica already mentioned. The retina and hyaloid embrane adhered firmly, and formed a whitish thickened mass, enclosing the infiltrated cells of the vitreous body, but presenting apertures of communication at arious points. The lens was transparent; the iris was adherent to the capsule. ome blood was effused in the anterior chamber, with some traces of lymph.

Left eye. The cellular tissue around this eye was also indurated, infiltrated ith serum, and closely adherent to the sclerotica, which was much thickened, specially at the entrance of the optic nerve. The choroid adhered firmly to the nner surface of the sclerotica. Very little fluid was found interposed between he choroid and retina. On turning back the choroid, the retina, hyaloid membrane, and vitreous body were found united into a firm yellowish mass, having much the appearance of coagulable lymph, and with scarcely any traces of purulent matter. The ciliary body was of a dark red colour; the lens and its capsule transparent; a slight effusion of blood in anterior chamber.

Both lungs adhered at several points to the pleura costalis, but they were chiefly cellular adhesions. The left lung was collapsed to one-third of its ordinary size. A fibrinous concretion was found in the left ventricle of the heart, but not firmly adherent to its inner surface.

Maclellan was a strong muscular man. As is noted in the case, he had had pleurisy some weeks before he was seized with the affection of his eyes, and had been bled for it. Whether he had any inflammation of the vein which had been opened, could not be learnt. The medical gentleman who first saw him, when he began to complain of his eyes, considered the symptoms as indicative of inflammation of the brain. The patient complained of severe pain in his head; he was bled for this, and had calomel and opium. He was also seen by Dr W. Brown, before being admitted into the Eye Infirmary. Dr B. saw him 10 or 14 days after the commencement of the ophthalmic disease. Both pupils were then widely dilated, the

one more than the other, and immovable. The retinæ were insensible to a lighted candle. The pain had subsided. There was considerable eversion of the lower eyelids. Dr B. proposed puncturing between the lower eyelid and the eyeball, on the presumption that matter was effused there.

The reader is, no doubt, well acquainted with the fact, that phlebitis is apt to be followed by what have been termed *purulent deposits*, in different parts of the body, and that these have generally been ascribed to the circulation of pus in the blood-vessels. The notion, however, that the matter found in the lungs, liver, brain, cellular membrane, and other parts, in cases of phlebitis, is actually that which has been carried through the circulation from the vein originally injured or inflamed, is now almost universally abandoned. The matter found in the organs secondarily inflamed is doubtless secreted in these organs themselves; and according to Professor Cruveilhier[5] and Mr Douglas,[6] it is probably from inflammation of the veins of these parts, that the secondary affections arise. Far from regarding any mere deposit of pus from the general circulation as the efficient cause of the secondary abscesses which occur in consequence of phlebitis, it is the opinion of both these inquirers that the circulating pus acts only by irritating the coats of the capillary veins in different organs of the body, and exciting them to inflame; and that these inflamed veins produce a circumscribed suppuration around themselves. This is not a conjecture, but an opinion founded on various and accurate observations.

To apply these views to the eye, we cannot believe that the same pus which has passed from the uterine veins, or from the veins of the extremities, in cases of phlebitis, is deposited between the choroid and retina, or in the aqueous chambers of the eye, but that the textures in the neighbourhood of which pus is found in phlebitic ophthalmitis have themselves been excited to inflammation; and it is, according to our present knowledge of the subject, the most probable supposition, that the minutest veins of these textures are the parts, in which the circulating pus is first arrested, and in which the irritation and secondary inflammation are first produced.

The effects of the inflammation of a vein may be distinguished into primary and secondary, local and remote. We must not confound these several effects. Take, for example, suppurative inflammation of the veins of the uterus after parturition. The *primary* effects are increased thickness of the coats of the affected veins, false membranes on their internal surface, gradual coagulation of their contents, deposition of pus in their cavities, and occasionally entire destruction of their texture. The *secondary* effects are abscess in the liver, purulent collections in the chest, inflammation and ulceration of the synovial membranes, and phlegmonous ophthalmitis. The effects just now enumerated are also *remote*, while the swelled leg, or phlegmasia dolens, is an example of a *local* effect. It is a consequence merely of the obstructed state of the iliac and

femoral veins, produced by the original inflammation extending into these vessels. It would be incorrect, then, to speak of phlegmasia dolens of the eye, as some have done, meaning thereby the secondary and remote inflammation of that organ, arising from the circulation of purulent matter.

Local symptoms. The symptoms of phlebitic ophthalmitis bear a close resemblance to those of acute retinitis, already described; and the disease manifests the same three stages. See page 497.

The disease begins slowly and insidiously in some cases; suddenly and severely in others. One eye or both may be affected. Sometimes the inflammation seems to commence in the ocular conjunctiva; at other times, it proceeds from the orbital tissues. In many cases, the retina appears to be the focus of the disease.

Pulsatory pain (exactly as in the most intense panaris or whitlow) is felt in the bottom of the eye and orbit, spreading to the forehead and temple, and accompanied with a sensation of burning heat, tension and fulness, as if the eye could not be contained within the orbit.

The patient complains of photophobia to a great degree, with photopsia, or flaming and shining vision. The smallest ray of light occasions a severe feeling of intolerance. This symptom occurs chiefly in the commencement; by and by it totally subsides, the retina having become insensible, from the effects of the inflammation on its substance, or from the compression arising from the fluids extravasated from the surrounding textures.

There is phlegmonous swelling of the eye, the intra-orbital tissues, and the eyelids. The eyeball is hard, and incompressible to the touch, and is pushed almost completely out of the orbit. From the fibrous texture of the shell of the eyeball, we might think it incapable of extension; and, no doubt, it is from its yielding so little, that the severity of the pain arises which attends ophthalmitis. Still it does yield, and the eyeball is distended and increased in volume and contents. Much less so, however, than its state of extreme protrusion, and its pressure against the eyelids, might lead us to suppose.

At first, the conjunctiva is rather œdematous than very red. The aqueous humour is sanguinolent; the iris changed in colour; the pupil contracted; the fundus oculi reddish or greenish. There is an involuntary fixedness of the eyeball, the state of pain and swelling rendering its common movements almost impossible.

Constitutional symptoms. The constitutional symptoms which attend any secondary phlebitic disease, such as ophthalmitis, are generally of a typhoid description; rigors, prostration of strength, rapid feeble pulse, insomnia, anxiety, low wandering delirium, attacks of vomiting and purging, and a brown parched tongue. Hence the difficulty of the cure, and the little good effected by depletory measures.

Prognosis. Phlebitic ophthalmitis has different terminations.

1. It terminates in amaurosis, as it did in the case I have related,

where it arose from erysipelas. The eyeball may remain almost natural in size, or it may become atrophic. The capsule of the lens is left opaque, and the pupil small and adherent.

2. Phlebitic ophthalmitis terminates in suppuration and rupture of the eye. The cornea infiltrates with pus, and becomes ulcerated; sometimes it is affected with gangrene, and throws off a distinct slough. In some cases, the sclerotica gives way, and pus is discharged.

3. This disease terminates by death. This termination would certainly happen more frequently, if the eye did not burst spontaneously. The relaxation which results from the bursting of the eye diminishes the violence of the inflammation, and the disease subsides, as does a whitloe treated by a deep incision. On the other hand, the inflammatory action, if unsubdued, is propagated to the brain or its membranes, and ends in fatal coma.

The danger of the disease spreading to the brain, must render our prognosis always extremely guarded. According to the intensity of the symptoms, and their seeming tendency to such or such a termination, the friends must be warned of the dangerous, or very dangerous, state in which the patient is.

Treatment. In the *first* stage, reiterated venesection is the chief remedy. The vein should be re-opened as often as the hardness of the pulse, and the other symptoms, point out the propriety of farther depletion. Tartrate of antimony may be given in frequent small doses. Abstinence must be enjoined, and diluent drinks administered. Leeches are to be applied, or the neck and temples may be scarified and cupped. Cold compresses should be kept constantly over the eyelids. Mustard-baths of the feet are likely to be useful during this stage, and even blisters to the neck may be employed.

In the *second* stage, the products of inflammation are pent up within the eyeball, and cannot be discharged. Paracentesis oculi, that is, puncturing of the cornea, so as to evacuate the aqueous humour, or puncturing of the sclerotica, if vision is judged to be extinct, is to be employed. By puncturing the sclerotica, there is perhaps very little discharged, but the tension is taken off, and the danger is set aside of the disease spreading to the brain. The form of the eye may be preserved by these means, and suppuration prevented. I have seen this treatment save the life of the patient.

Should the disease go on to suppuration, the matter escapes by the aperture made in the cornea, and the eye sinks; or if the wound of the cornea has healed, it is to be opened again. A warm poultice should be laid over the eyelids.

During the second stage, the antiphlogistic treatment, recommended for the first, is still to be more or less adhered to.

In the *third* stage, the eye having been emptied, either spontaneously or by the knife, the parts remain for a time swoln and painful; but as the suppuration goes on, the swelling of the tissues falls, and the remains of the eyeball shrink. Some slightly astringent fomentation may now be used.

[1] London Medical Gazette ; Vol. ii. p. 284 ; London, 1828.
[2] Medico-Chirurgical Transactions ; Vol. xv. p. 120 ; London, 1829.
[3] Ibid. Vol. xiii. p. 189 ; London, 1825. A case of phlegmasia dolens, with affection of the eye, is recorded by Dr Lee, in Ibid. Vol. xv. p. 370.
[4] London Medical and Surgical Journal ; Vol. iii. p. 360 ; London, 1833.
[5] Anatomie Pathologique, Tome i ; Livraison ii. Dictionnaire de Médecine et de Chirurgie Pratiques, art. *Phlebite*.
[6] Inaugural Essay on Phlebitis ; Glasgow, 1835.

SECTION XXX.—COMPOUND OPHTHALMIÆ.

Strictly examined, few instances of the ophthalmiæ will be found absolutely simple. Many are strikingly compound, even from the first; for example, the catarrho-rheumatic, already described. In other cases, one variety is grafted on another; for instance, scrofulo-catarrhal ophthalmia, beginning as a slight puro-mucous conjunctivitis, but soon manifesting, in addition, the signs of phlyctenular ophthalmia. We often meet with aphthæ of the conjunctiva, combined from the commencement with blenorrhœal inflammation of that membrane. Phlyctenular conjunctivitis with scrofulous iritis, scrofulous corneitis with iritis, arthritic with syphilitic iritis, traumatic with syphilitic or scrofulous ophthalmia, and many other compound ophthalmiæ might be enumerated.

The treatment of such diseases will, of course, consist in the combined use of the means, which are ascertained to be effectual in removing the simple forms of the ophthalmiæ. The treatment necessary for scrofulous ophthalmia will be combined, therefore, with that for catarrhal conjunctivitis, in the scrofulo-catarrhal cases ; while in the catarrho-rheumatic ophthalmia, the remedies for rheumatic inflammation of the sclerotica will be required along with those for blenorrhœal inflammation of the conjunctiva ; and so on, in the other compound ophthalmiæ.

SECTION XXXI.—TRAUMATIC OPHTHALMIÆ.

It has been explained in the preceding sections of this chapter, how each texture of the eye suffers, in its own way, from inflammation, excited without any evident mechanical or chemical injury ; the conjunctiva suffering puro-mucous and eruptive diseases ; the sclerotica, rheumatic disease ; the iris undergoing adhesive inflammation ; the cornea losing its transparency, and becoming the seat of purulent infiltration and of ulceration ; the choroid falling into a state of extreme varicosity, and protruding through the sclerotica ; and the retina losing its sensibility to light ; every texture, in fact, suffering differently.

Now, the inflammation which is excited by the evident mechanical or chemical injuries, the first effects of which have been considered in the first and second Sections of Chapter IV. and in Chapter XI. may attack one or several of these textures. We may have traumatic conjunctivitis, traumatic corneitis, traumatic iritis, &c. and it is remarkable, that traumatic inflammation in any of the textures of the eye imitates, so to speak, the ophthalmiæ which we have already considered. We meet with puro-mucous conjunctivitis, excited by injury, and we very often see pustular or phlyctenular conjunctivitis, brought on by the same cause. Traumatic iritis, (the iritis, for example, which is so apt to occur after the operations for cataract,) very closely resembles rheumatic iritis, but in certain subjects is nothing else than the disease already described as arthritic iritis. The cornea, by traumatic inflammation, is rendered opaque, or becomes affected with onyx, or with ulceration; the lens also loses its transparency from the same cause, and the retina its sensibility.

This observation, if duly understood, will throw a great degree of light on the treatment of the traumatic ophthalmiæ. Puriform inflammation of the conjunctiva, arising from injury, is to be treated, in fact, exactly as we treat catarrhal ophthalmia. In traumatic iritis, the three great objects, to abate the inflammatory action by depletion, to oppose the contraction of the pupil by belladonna, and to promote absorption by mercury, are to be followed out, exactly as in rheumatic or syphilitic iritis.

For these reasons, I thought it proper to say nothing of the traumatic ophthalmiæ, till we had finished the consideration of the varieties of inflammatory disease, which are excited in the different textures of the eye by atmospheric and constitutional causes. Without a knowledge of these varieties of the ophthalmiæ, we should be but little able to understand the inflammatory effects of evident mechanical and chemical injuries upon the several structures combined in the eye; but with such a knowledge, both the symptoms and the treatment of the traumatic ophthalmiæ become perfectly simple. These symptoms vary, no doubt, *ad infinitum*, in regard to severity; while in one case, a single texture, and in other cases, several textures of the eye will suffer; still, the invariable and peculiar physical and vital properties of each texture serve to produce, under whatever circumstances or by whatever causes inflammation may be excited, the same essential phenomena.

The general results of injury of the eye are irritation, epiphora, photophobia, inflammation, and the consequences of inflammation, as suppuration, ulceration, &c. The general treatment consists in rest of the eyes and of the body, exclusion of light, low diet, purging, bleeding, calomel and opium, refrigerants to the eye, and dilatation of the pupil.

In some cases, even a slight injury is followed by such a complete inflammation as to warrant the appellation of *ophthalmitis phlegmonosa*. The eye swells and protrudes from the orbit, the fundus oculi reddens, the hyaloid becoming infiltrated with pus as-

sumes a green colour, the cornea suppurates, the eye bursts, and ultimately shrinks. Such violent and general inflammation of the eye from an injury, is likely to happen, only when the treatment has been trifling, or absolutely improper.

An important general rule regarding the treatment of the traumatic ophthalmiæ, is, that we should be on our guard against effects which are apt to be produced, but which may not yet be present, and against effects implicating the interior textures of the organ, although the injury has been, or at least has appeared to be, merely superficial. A considerable part of our treatment must be preventive. We must not delay to take away blood, till severe sclerotitis, with acute circumorbital pain, sets in. We ought to bleed from the moment of a severe injury. We must not wait till the pupil is evidently closing; but apply belladonna, and prevent it. We must not wait till the iris grows discoloured, or lymph is effused into the pupil; but from the very first put the patient on calomel and opium, if we apprehend from the nature of the injury, that iritis is likely to be the result. Our attention should be confined, neither to the texture immediately affected by the injury, nor to that which seems most inflamed after an injury. I have known a minute fragment of steel sticking in the cornea, produce pretty severe iritis and sclerotitis, with scarcely any perceptible inflammation of the cornea, and while the iritis was properly enough treated, the cause remained overlooked.

It is not unworthy of observation, that after all the other symptoms of severe inflammation of the eye, following mechanical or chemical injuries, have been removed by depletion, counter-irritation, mercurialization, &c. a very troublesome and obstinate intolerance of light, with epiphora, is apt to remain, not so much apparently from irritation arising from the state of the eye, as merely from continued and now habitual excessive activity in the lids and lacrymal gland. In such cases, in addition to the remedies recommended for epiphora, I have derived advantage from the internal use of the extract of stramonium.

SECTION XXXII.—ARTIFICIAL OPHTHALMIÆ.

Soldiers have been detected exciting inflammation of the eyes, by the introduction of different substances within the conjunctival folds; or, when already affected by ophthalmia, they sometimes endeavour to aggravate the symptoms, or to prevent a cure, by the same practice; their object in all this, being to produce permanent injury to the eyes, or even loss of sight, so as to be discharged, and to obtain a higher pension than they would otherwise be entitled to.

The irritants employed for exciting inflammation of the eyes by soldiers are very various; as, muriate of mercury, common salt,

nitrate of silver, sulphate of copper, quicklime, nitric acid, cantharides ointment, snuff, the juice and ashes of tobacco, a bit of woollen cloth, &c.

When a suspicion arises that a number of soldiers together are simulating puro-mucous ophthalmia, or endeavouring to produce serious injuries of their eyes, by the use of irritants, the suspicion will of course be increased, if the disease is almost exclusively confined to the privates or non-commissioned officers of a regiment, without affecting the commissioned officers, or the women and children; also by the circumstance of the inflammation being very frequently confined to one eye, and that almost always the right.

In many cases, it may be possible, from the suddenness and character of the symptoms, not only to detect the factitiousness of the disease, but to discover what particular substance had been used to induce it; or the substance itself may be found in whole or in part. For instance, Mr Marshall[1] once detected a patient in hospital for ophthalmia, with a small portion of black muslin spread over the cornea of the right eye. This man had recently lost the power of vision in the left eye, probably from artificially excited inflammation.

When an acrid powder, as quicklime, is employed, it commonly occasions a sloughy ulcer in the lower fold of the conjunctiva, and sometimes particles of the lime are found adhering to that membrane. Cantharides, in any form, suddenly induce a great degree of chemosis, with swelling of the eyelids, and most violent itching. A strong acid produces instant disorganization of the conjunctiva, so that it becomes white, and swoln, and is ready to peel off; at the same time the cornea is whitened, and speedily sloughs.

In one instance, the depth and defined edges of the ulceration having led the surgeon to suspect the application of some acrid substance to the eye, the soldier was searched, and a paper of corrosive sublimate was found in his possession, with some manuscript directions for its use, in which it was recommended to put a minute portion into the eye on going to bed, to repeat it every third night, and to be cautious not to put in too much, lest the eye should be destroyed. There was annexed to this prescription, a receipt for removing the artificial disease, consisting in a decoction of parsnips and leaves of clover, with which the eye was to be fomented.[2]

In the year 1809, three hundred of the men of two regiments on duty at Chelmsford, became affected with ophthalmia. The healthy men of the corps were removed to another station, and the sick remained in hospital, but under military command. Information having reached their commanding officer that one of the nurses of the hospital was in the habit of going to a druggist's shop for the purpose of purchasing medicines, suspicions were excited. Accommodation having been provided for about 24 men, the number contained in one ward, at midnight the officer made his appearance in the hospital, the men were roused from their beds, and forthwith marched in a state of nudity to the new ward. The old ward was secured for the night; and next day when the beds were examined, a num-

ber of small parcels of corrosive sublimate were found concealed. Means were taken to prevent a supply of this article, and in a very short time 250 of the men recovered.[3]

To excite disease of the palpebræ, the cilia are sometimes extracted, and caustic applied to the part.

The most effectual means of counteracting attempts to injure the eyes by the application of noxious substances, is the seclusion of suspected individuals. Handcuffs are sometimes necessary, or a tin mask for the face, so contrived as to prevent the patient's access to his eyes.

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[1] Hints to Young Medical Officers, &c. p. 112; London, 1828.
[2] Ballingall's Outlines of Lectures on Military Surgery, p. 437; Edinburgh, 1833.
[3] Ibid. p. 581.

SECTION XXXIII.—SYMPATHETIC OPHTHALMIA.

I have now to direct the attention of the reader to a disease of the eye, which my colleagues, at the Glasgow Eye Infirmary, and I have usually distinguished by the name of *iritis sympathetica*. It is a very serious disease; indeed, it has generally proved, in the long run, intractable in our hands; and as it follows, and is in fact the result, in the one eye, of a previous mechanical injury, which has already greatly impaired or destroyed the other, the treatment of it involves a heavy responsibility on the part of the practitioner. Whenever I see sympathetic ophthalmia, even in its first stage, I know that I have to contend with an affection, which, however slight its present symptoms may be, is one of the most dangerous inflammations to which the organ of vision is exposed.

The general nature of the sympathetic affection which I am about to illustrate by references to the journals of the Glasgow Eye Infirmary, is inflammation, not of the iris alone, but involving the whole of the internal textures of the eyeball, especially the crystalline and vitreous capsules and the retina; coming on, generally, in five or six weeks after an injury of the opposite eye, and terminating, most frequently, in atrophy and total amaurosis of the eye secondarily affected. The one, also, which received the original injury generally ends, or has already ended, in amaurosis and softening of the globe.

Case 229.—Henry Paterson, aged 25, admitted 31st January 1827.

Two months before his admission, he struck the left eye against a nail which stood out from a door-post. The upper part of the iris is no longer in view, so that the pupil is much enlarged, and shifted to behind upper edge of cornea. Severe inflammation has followed the accident, and has communicated itself to the right eye, which, indeed, suffers more at present than the left. Both eyes exceedingly irritable on exposure to light, and affected with profuse epiphora.

The right pupil small; both irides greenish, and both corneæ hazy. Retains a degree of vision in left eye. Bowels very bound. Leeches have been applied frequently to the temples.

On the 7th February, he is reported as improving, but very slowly. The treatment consisted in an emetic, followed by calomel, opium, and tartrate of antimony, with blisters, belladonna externally, and solution of nitrate of silver to the eyes.

We find from the subsequent reports, that his mouth becomes sore, and the pain diminishes. Afterwards the tenderness of both eyes increases and diminishes alternately.

On the 6th April, he is stated not to have improved for the previous fortnight. On the 16th his mouth is sore, and his eyes decidedly improved. On the 30th, mouth well; inflammation continues to decline; vision of right eye very much better.

On the 11th May, left lens is mentioned as in an opaque state, and pressing the iris into contact with the cornea. After this, paracentesis corneæ was twice performed, but with little or no relief.

About the middle of June, the irritability of the eyes diminishes. This symptom had continued in a very distressing degree; but on the 11th July, the report states, that he can now open his eyes, which he attributed very much to steaming them with laudanum. On the 20th, intolerance of light much abated, so that the right pupil can now be observed contracted, and filled with a fibrinous effusion.

August 15th. Can now distinguish objects of moderate size. Inflammation and intolerance of light continue to decline. This improvement took place under the continued use of calomel and opium, and a decoction of elm bark.

September 17th. Inflammation now gone; vision improves slowly. Centre of right anterior capsule opaque. Pupil somewhat contracted and adherent.

November 16th. Right pupil as at last report. Vision considerably improved.

February 25th 1828. Vision improving.

During these 12 months, a great variety of remedies were employed. The principal were leeches, scarifications of the eyelids, paracentesis corneæ, blisters, tartar emetic eruption, a caustic issue, purgatives, calomel and opium, cinchona, elm bark, belladonna externally, solution of nitrate of silver, and vinum opii to the eyes, anodyne fomentations, and red precipitate salve. Whatever benefit arose from the treatment, was to be ascribed chiefly to the first, eighth, and thirteenth of these remedies.

We saw nothing more of Paterson till the 8th September 1830, when he was re-admitted, for the purpose of having an artificial pupil formed in his right eye.

The report, at his re-admission, states, that his right pupil continues very small, irregular, filled with lymph, and attached to the capsule. Within the last 12 months, his vision has greatly declined, so that when his back is turned to the light he can discern merely the reflection from the face of a person standing before him. The iris is of a green colour, but there is no vascularity on the surface of the eye. Says that upon catching cold, the eyes are apt to become tender.

On the 19th I performed the operation of incision with Maunoir's scissors. I need not describe the operation, nor the difficulties with which it was attended. Any hopes of a restoration to sight by the operation were completely frustrated, in consequence of a blow which the unfortunate patient received on the right eye, from a person who was intoxicated, on the 28th March 1831. This filled the aqueous chambers with blood, and completed the disorganization of the eye.

Case 230.—Joseph Moore, aged 30, was admitted 14th December 1834.

About three months ago, the right cornea was cut by a chip of cast steel. Some portion of the humours escaped. Violent inflammation followed, which has terminated in discoloration of the iris, and contraction of the pupil to a mere point, which is occupied by opaque capsule. Complete extinction of perception of light in this eye.

About a month after the accident, the pain, which was at first chiefly confined to the right orbit, extended to the left. Since that time, he has had symptoms of iritis in left eye. The iris is discoloured; the pupil irregular, contracted, not affected by light, and occupied by opaque capsule, apparently adherent to

margin of iris. The opacity is less dense in the centre. With this eye he can distinguish the bars of the window, and count the fingers interposed between him and the light. Occasional circumorbital pain on both sides. Severe pain in bulb of left eye, especially at night.

Has been bled, and used some mercurial preparation, with temporary and partial benefit.

On his admission, he was bled at the arm, leeches were applied to left conjunctiva, belladonna extract was smeared round the eyes, and he was ordered a pill, morning and evening, containing calomel, opium, and belladonna leaf, of each a grain.

Under this treatment, he improved slowly, but he still complained of pain in the ball of his eyes. Two grains of belladonna leaf were substituted for 1 grain. His mouth became sore, and the pain was relieved. It soon returned, and seems to have been but slightly alleviated by opium and belladonna internally, which made up the chief part of the treatment during January.

On the 5th February, the report states, that considerable improvement had taken place in the vision of the left eye. Gentian, and afterwards quina, appear to have been employed on account of general weakness. No further improvement is noticed.

Case 231.—James Downie, aged 25, was admitted 5th January 1837.

About three months ago, his right eye was wounded by a splinter of steel. It now presents a cicatrice at the junction of the cornea and sclerotica, towards nasal side of eye. The pupil is dragged towards the cicatrice, while the portion of iris most remote from the cicatrice appears on the stretch. There is some opacity towards lower part of pupil. No pain. Vision of right eye much impaired.

About seven weeks ago the left eye became affected. The iris is now discoloured; the pupil contracted and irregular. The form of the eye is altered, the anterior part being projected. The conjunctival vessels are enlarged, and there is a bluish zone round the cornea. Does not complain much of pain in left eye; its vision seems nearly extinct.

Has been bled, blistered, and mercurialized, and had improved considerably, but having gone to the country about 10 days ago, he became much worse.

Leeches were applied to the left upper eyelid, and a blister behind the ear. Calomel and opium were prescribed and Dover's powder at bedtime. These remedies were continued, along with repeated leeching, and the external use of belladonna, during the month of January, with little or no effect on the eyes. On the 1st February, the report states, that, with his back turned to the light, he distinguishes objects with the right eye, but not with the left. He is put on a solution of ʒij. of hydriodate of potass in ℥viij. of water, a table-spoonful thrice a day; and the quantity of the hydriodate is increased gradually to ʒiv. There is no notice of any improvement, but, on the contrary, the surface of the iris is stated to have become vascular, a very unpromising symptom; and on the 16th he is ordered to be bled at the arm, on account of increased inflammation of left eye. His mouth does not appear to have become sore. The bleeding at the arm relieves the pain of left eye. On account of costiveness, the calomel and opium pills are changed for blue pills. On the 22d, his mouth is pretty sore, but there is no improvement in vision, and the irides are described as assuming a gilt green colour. He now complains of want of sleep, and is ordered opium and sarsaparilla. This last medicine appears to have been continued for nearly two months, but without benefit.

On the 22d of April, the sarsaparilla is discontinued, and he is ordered one-sixteenth of a grain of oxide of arsenic thrice a-day. On the 6th May, the report states, that there is no change. The outer margin of each iris is occupied by a lavender coloured ring. The left pupil is contracted and occupied by opaque capsule.

Case 232.—Robert Finlay, aged 24, admitted 5th July 1837.

Last night the right cornea was penetrated by a screw-driver, so as to form an angular flap, with the apex pointing downwards and inwards, while the extremities of the incision are separated by a space equal to the diameter of the cornea. Much blood is effused into the anterior chamber. The iris appears to be wounded; the state of the pupil cannot be discovered. Vision with this eye is reduced to a

mere perception of light. The eyelids were brought together, and a bandage applied. Venesection. Six grains of calomel.

6th. Pain relieved. As the calomel had not purged, he was ordered 3 aloes and blue pills.

August 1st. Wound cicatrized; pupil very irregular; considerable vascularity of eye; little pain. Blister behind right ear. Collyrium muriatis hydrargyri.

5th. Eye less vascular. Lids adhere in the morning. Four grains' solution of nitrate of silver.

Leeches were after this applied twice to the eyelids.

13th. Since yesterday, an attack of iritis sympathetica of left eye, with pain beneath the eyebrow during the night. Upper edge of pupil appears tagged to capsule. Ascribes this attack to having read a book, in small type, for three or four hours last night. Pulse 84. Venesection. Belladonna to left eyebrow and upper eyelid. Six grains of calomel, and 1 grain of opium, at bedtime. ℥i. of sulphas magnesiæ to-morrow morning.

14th. Blood buffy; pain greatly relieved. Cornea flexible; pupil tagged above and below. Eight leeches round left eye. Calomel and opium at bedtime, and salts to-morrow morning.

15th. Pupil transversely oblong; vision very dim. Venesection. Blister to left side of head. Four grains of calomel, and half a grain of opium, thrice a-day.

16th. Blood buffy.

17th. Pain of left eye entirely gone; pupil still irregular. Mouth not affected; tenesmus. ℥j. of castor oil. Calomel and opium continued.

18th. Venesection.

19th. Blood buffy. Eye much less vascular; vision clearer.

20th. Cornea less flexible.

21st. Castor oil repeated.

23d. Pupil more regular; eye free of vascularity.

24th. Two grains of calomel, and a quarter of a grain of opium, daily.

27th. Mouth sore. Calomel and opium omitted.

31st. One grain of sulphas quinæ thrice a-day.

Sept. 1st. Lower part of pupil more regular.

3d. One ounce of sulphas magnesiæ.

4th. Very numerous minute whitish spots, apparently on the inner surface of left cornea, opposite lower edge of pupil. Belladonna omitted.

7th Sulphas magnesiæ repeated.

8th. Calomel and opium resumed.

12th. As the pupil contracts from the omission of the belladonna, vision becomes dimmer. Calomel and opium morning and evening.

15th. Vision clearer.

He had sulphate of magnesia on the 13th, 14th, 19th, 24th, and 25th. On the 26th the calomel and opium were stopped.

27th. One grain of opium. Alum gargle.

29th. No pain in right eye, unless when pressed with the hand. The minute white spots on inside of left cornea still very numerous. With this eye reads a very large type. Two grains of extract of stramonium morning and evening.

October 5th. Was attacked last night with violent pain in both eyes. At present the pain affects principally the left eye. Venesection. To foment the eyes with poppy decoction.

6th. Left conjunctiva this morning in a highly chemosed state. Venesection. Four grains of calomel and 1 grain of opium at bedtime, and half these quantities in the morning.

7th. A much better night; inflammation greatly abated.

10th. A recurrence of severe pain this morning. Leeches. Fomentation.

13th. Has again had a smart attack of pain. Pulse 84, feeble. Fomentation.

14th. Mouth sore. Calomel and opium omitted. Alum gargle. Blister behind left ear.

16th. No pain in eye. Mouth better.

18th. Another attack of pain this morning. Five leeches. Fomentation.

21st. Has continued easy since the application of the leeches.

25th. Again seized with pain in the forenoon, accompanied with vomiting in the evening. Four leeches. Fomentation.

November 8th. Has continued free from pain since last report.

10th. Some pain in right eye. Two leeches. Two grains of calomel and half a grain of opium at bedtime.

December 10th. At present, the right eye is entirely free of inflammation. Its cornea is bounded by an irregular line, and is reduced to half of its original size. Distinct perception of light and shade with this eye. The cornea of left eye is now unnaturally prominent, and surrounded by a reddish zone. The iris is greatly altered in colour, and is bulging forwards, so as to be very nearly in contact with the cornea. The pupillary margin seems to be adhering to the capsule, which is opaque in the centre. The perception of light is less even than in right eye. Some palpitation of the heart for four or five weeks. Pulse 110, rather sharp.

Case 233.—Jane Gartshore, aged 15, admitted 30th April 1838.

Six months ago, left cornea was divided, towards its outer edge, by being struck against the latch of a door. The iris had protruded, as it is now dragged towards the site of the wound, and fixed there. What remains of the pupil is occupied by opaque capsule. Large varicose vessels run towards the cicatrice. There are also numerous red vessels on the surface of the iris. This eye retains the perception of light and shade.

Four or five weeks after the injury, sympathetic iritis came on in the right eye, and the vision of this eye, also, is now reduced to a perception of light and shade. The right iris is of a dingy green colour, with numerous varicose vessels running over it. The pupil is contracted, irregular, and adherent to an opaque capsule. Both irides are close to the corneæ.

Has now no pain. It was severe in the left eye, for nearly four months; but the right eye, she says, has never been affected with pain. General health was previously good. Pulse 120. Was twice bled at the arm; applied leeches and blisters; and took some medicine, which did not affect her mouth. Two grains of calomel and half a grain of opium, thrice a-day.

May 7th. Thinks her vision improved.

Case 234.—David Mill, an engineer, aged 38, admitted 30th August 1838.

When residing in Edinburgh, 18 months ago, and whilst chipping iron, a splinter entered right eye, at outer edge of cornea. He continued to work for six weeks with his right eye tied up, when, the left eye beginning to inflame, he gave up working. About two months after receiving the injury, a swelling formed over the wounded part, which swelling being cut off, the splinter of iron, he says, was extracted.

The right pupil is dragged towards the cicatrice; the nasal portion of the iris is on the stretch; the capsule of the lens is opaque; the iris is close to the cornea, and is pretty natural in colour. The eyeball is of the healthy consistence, and the cornea not more flexible than natural. No pain in right eye. With this eye discerns the fingers indistinctly, and sees a pen as a long stalk. Thinks vision of right eye improving.

About a fortnight before the piece of iron was extracted from right eye, the left began to be inflamed, and has suffered severely from iritis sympathetica. The iris is greenish; the pupil is nearly natural in size, but is misshapen, with its edge jagged, and fixed by adhesions to the capsule. Within the verge of the pupil, the capsule presents a whitish wreath, without any red vessels. The whole of the lens is hazy, and of a greenish hue; consistence of eye natural. With this eye, knows the Infirmary card to be printed, and reads a type about three-quarters of an inch in size.

Was at first affected with severe nocturnal circumorbital pain, for which he applied leeches, but was not bled at the arm. His mouth was made sore with mercury, which relieved the pain, and improved his sight. Left eye has been pretty free from redness till within four or five months ago. Within last month its power of vision has declined, for at that period he could read an ordinary type. Pulse 84. Thirst. Appetite deficient.

A pill, every night, containing two grains of calomel, and half a grain of opium. Belladonna collyrium.

31st. Has had no eruption on his skin. This question was put, with reference chiefly to syphilis; as in one of the cases previously treated at the Infirmary, there was some reason to suspect a syphilitic complication.

September 4th. Complains more of photopsia in both eyes, with occasional headach. Less thirst; appetite improved; bowels rather confined. ℥i. of castor oil.

5th. Still complains of flashes of light in both eyes. Blisters behind ears.

6th. Vision of both eyes, he thinks, improved. Mouth sore. Pill omitted.

7th. Alum gargle.

8th. Castor oil repeated.

11th. Three leeches to nasal angle of left eye.

18th. Complains more of pain in left eye. Bowels rather costive. Castor oil repeated.

19th. Left eye relieved. To take 20 drops, thrice a-day, of a solution of 15 grains of murias barytæ in ℥ss. of tincture of cinchona.

20th. Thinks vision of right eye somewhat improved since his admission. Sees the large letters, which he read at his admission, plainer. No visible change in either eye.

The conclusions to be drawn from the above cases, and from similar ones recorded by other authors, may be arranged under the following heads:—

1. The kind of injuries, which, affecting one eye, are apt to induce sympathetic inflammation in the other. 2. The date at which attacks of sympathetic iritis, or retinitis, are apt to occur. 3. The subjects in which this disease is generally observed. 4. The exciting causes of sympathetic ophthalmia. 5. The symptoms, local and constitutional. 6. The nature of the connexion by means of which this sympathetic affection is brought on. 7. The diagnosis. 8. The prognosis. 9. The treatment.

1. The injuries, which, affecting one eye, are most apt to excite sympathetic inflammation in the other, are penetrating and lacerating wounds, inflicted by cutting instruments, or by the forcible projection of splinters of iron or stone, or the fragments of percussion caps.

A mere blow on the eye, (for instance with a stick) has been known to impair the other sympathetically. Mr Wharton Jones has communicated to me the case of a gentleman, by whom he was consulted, to whom it happened, that, in firing a gun, the percussion cap struck one eye, making its way through the lower lid and sticking in the sclerotica; the result of which was internal inflammation first of the eye struck, and afterwards of the other. When Mr Jones saw the patient, the eye which had been wounded was soft and atrophic, and the other was becoming so. On the 16th September 1833, a quantity of sulphuric acid was thrown maliciously into the left eye of Mary Macshaffery, aged 26 years. The consequence was destruction of the cornea, and union of the whole of the upper eyelid to the remains of the eyeball. About the end of December, she began working in a cotton-mill, her usual employment. This produced a severe attack of sympathetic ophthalmia, ending in haziness of the cornea, discoloration of the iris, immobility of the pupil, and such deterioration of vision, that at her admission to the Glasgow Eye Infirmary, she could not make

out the large letters on the Infirmary card. Such facts illustrate the diversity of injuries which may give origin to sympathetic ophthalmia. In general, however, it is from penetrating wounds that the disease we are now considering takes its rise. Sometimes the wound is inflicted by such an instrument as a chisel or screw-driver, so that there can be no suspicion of any thing being lodged within the eye; while, in other instances, the suspicion is strong, or there is an absolute certainty, that a foreign body has passed through the tunics, and lies there unextracted. Sympathetic ophthalmia has been known to occur both where the foreign body has been extracted immediately after the receipt of the injury, and where it has lain for weeks within the eye.

The injuries now referred to are sudden and severe. They are generally attended by a loss of part of the humours, and by an extravasation of blood into the interior of the eye. The parts divided have generally been the cornea and iris, with a small part of the sclerotica and choroid. The junction, in fact, of the cornea and sclerotica, and consequently the annulus albidus of the choroid, is the place which has been wounded in most of the cases which I have seen. I think sympathetic ophthalmia is more apt to be excited, if the wound has produced a protrusion of the iris, and such a cicatrice of the cornea and sclerotica as keeps the portion of iris which had not been protruded perpetually on the stretch. If the wound has been so extensive as to divide or lacerate the retina, sympathetic inflammation is probably still more apt to occur. The injury which the lens suffers in such cases, and the traumatic cataract which follows, have little or no influence in causing sympathetic disease. A wound which implicates merely the cornea and lens, or even a wound of the cornea with simple prolapsus iridis, is not apt to excite sympathetic iritis. I have never known any of the operations for cataract bring on this affection; not even when, after that of extraction, the iris protruded, and the cicatrice which followed caused dragging of the opposite side of the iris. These facts, then, would lead us to conclude that injuries of that part of the choroid called the annulus albidus are most apt to cause sympathetic ophthalmia. If, along with a wound of that part of the choroid, there is a loss of part of the vitreous humour, and a laceration and protrusion of the iris, I should dread an attack of sympathetic inflammation; especially if, about the time of the cicatrization of the wound, the patient began to use the good eye in earnest, committed any irregularity in diet, over-fatigued himself, or suffered from mental excitement or distress.

2. Were we to judge of the period of time which generally elapses between an injury of one eye, and sympathetic inflammation manifesting itself in the other, from the six cases already related, we should say that five weeks was the most frequent period. In Paterson, the sympathetic affection came on three months after the injury; in Moore, the period was one month; in Downie, five weeks; in Finlay, five weeks; in Gartshore, four or five weeks; in Mill, six

weeks. In three out of six cases, recorded by Mr Lawrence,[1] the period is not mentioned; in the other three, the periods were a few weeks, five years, and soon after six weeks. In two cases recorded by Mr Wardrop,[2] the periods were three weeks, and one year.

3. The subjects of sympathetic ophthalmia have most frequently been, in my experience, men employed in iron works. At the time when their eyes were injured, their general strength was not impaired, but from their habits of life, and especially from their liberal use of spirits and tobacco, their constitutions were in an artificial state, very unfavourable for throwing off any inflammatory disease. Hence it appeared to be that the ophthalmia degenerated into the arthritic variety, and proved so intractable. In some of the cases I have seen, the sympathetic inflammation was modified by scrofula, a modification scarcely less troublesome than the arthritic. In one of the cases at the Eye Infirmary, Dr Kennedy observed that the wounds made in bleeding the patient at the bend of the arm generally suppurated; which led him to inquire whether a syphilitic taint might not be present. The patient acknowledged having had some primary syphilitic symptoms before he received the injury of his eye; but he had no sore throat nor eruption, and the eye, sympathetically inflamed, showed none of the peculiar indications of syphilis.

4. It sometimes happens that the patient is unable to specify any exciting cause for the sympathetic attack; but, in other instances, causes of this kind are distinctly mentioned. For example, in Finlay, the exciting cause was manifestly the reading, for three or four hours together, in a book printed in a small type, and in one of Mr Lawrence's cases, the eye had been incautiously worked. The wounds of the eye, which are apt to give rise to sympathetic iritis, commonly take from a month to six weeks to cicatrize. Whenever they are healed, the patients generally recommence their usual employments and modes of life; and then it is that the exciting causes of the sympathetic disease come into play.

The same sort of exciting causes which produced the first attack of sympathetic inflammation, also bring on relapses when the patient is recovering; and it is generally by a succession of relapses that vision is destroyed.

5. The local symptoms of sympathetic ophthalmia are those of iritis, passing rapidly into amaurosis and atrophy of the eye. Not unfrequently the first symptom is dimness of sight. This is rapidly followed by zonular redness around the cornea, dingy greenness of the iris, flexibility of the cornea, bogginess of the sclerotica, opacity of the capsule, greenishness of the lens, varicosity of the rectal vessels ramifying over the surface of the eye, contraction and adhesion of the pupil, puckering and bolstering forwards of the iris, and total insensibility of the retina. The pain is very variable; for in some it is slight, as in Gartshore, who said she had had no pain in the eye sympathetically affected, while in others it is severe, as in Finlay. Photopsia is a usual symptom about the commencement

f the attack. In some, there is great intolerance of light; in others, here is little. At length, the shrinking of the eyeball, and especially of the cornea, is very remarkable. In one of Mr Lawrence's cases, each cornea had shrunk to the size and figure of a barley-corn placed horizontally.

There can be no doubt that inflammation of the retina forms a part, and a chief part, in all cases of sympathetic ophthalmia. Perhaps retinitis occurs first, and added to it is the iritis. The early loss of vision shows that the retina is deeply implicated from the very commencement. The flexibility of the cornea, and softness of the sclerotica, indicate the vitreous fluid to be lessened in quantity. The changes which are visible in the capsule and in the iris are plain indications how far these textures are affected.

Sympathetic ophthalmia is generally an inflammation of that kind which is called *unhealthy*. It sometimes resembles scrofulous internal ophthalmia; more frequently it resembles arthritic ophthalmia. The symptoms are often such, that one skilled in German ophthalmology would at once say, here is arthritic iritis. As I have before remarked, if we use the term *arthritic* merely as a conventional one, to express a certain variety of eye-disease, characterized by certain signs, this may be allowed; but if by arthritic is meant strictly *gouty*, applied to the cases we are now considering, the term is incorrect. The subjects of sympathetic ophthalmia may have some peculiarity of constitution, produced by their mode of life, and by the nature of the ingesta to which they have habituated themselves; but there are not sufficient grounds for supposing that they labour under the gouty diathesis. It is more probable that the particular textures of the eye which are affected, and the modes in which these textures are suffering, produce the peculiar symptoms which present themselves so strikingly in such cases, and which the Germans call arthritic.

Amongst the constitutional symptoms we may mention quickness of the pulse, thirst, a marked buffy coat on the blood drawn from a vein, a pallid complexion, and obstinate constipation. A degree of ill health, in fact, has generally resulted from the confinement, want of exercise, and medical treatment necessary for the cure of the original accident, and in this debilitated state, the patient is attacked by the sympathetic disease.

6. The fact, that disease in one eye is liable to be followed by similar disease in the other, has long attracted attention. Inflammation, cataract, and amaurosis have especially been observed to occur in this way, from what is termed a *consensus oculorum*.

A little girl, who was an out-patient at the Glasgow Eye Infirmary, presented a curious instance of inflammation passing from the one eye to the other. She was affected with trichiasis, xeroma of the palpebral conjunctiva, and thickening and opacity of the cornea. At her admission, and for several years after, the symptoms were confined to the left side, the right eye being perfectly well. But, by and by, the same set of symptoms began to show themselves in

the right eye, only in a less degree. The corresponding eyelashes were inverted, the corresponding part of the conjunctiva became dry, and the corresponding portion of the cornea opaque.

Two patients, attending the Eye Infirmary about the same time as the child whose case I have just noticed, afforded instances of sympathetic amaurosis, and oscillation of the eyeball. In one of these patients, the left eye was destroyed by a blow, and eight days after, the right eye was found to be affected with oscillation, and a great degree of dimness of sight, but without inflammation. Less was known of the other patient's history, as the injury which destroyed the sight of his left eye, and produced almost a complete absorption of the iris, occurred in childhood; but he afforded another example of sympathetic oscillation and amaurosis.

Dr Albers relates[3] the case of a country-man, who, in a scuffle with his brother, was struck with a pitchfork in the right eye, whereby the cornea and iris were seriously injured. The wound healed in such a way that the sight was not entirely lost. In three days after the injury, the patient observed diminution in the vision of the left eye, and an opacity was discernible within the pupil. The opacity increased so rapidly, that in eight days there were all the signs of a fully formed cataract. Half a year afterwards, he was operated on by Professor Jung, of Marburg, but unsuccessfully, the patient remaining completely blind. Albers asks, if this case does not go to prove a decussation of the optic nerves, to which Himly replies in the negative. For suppose (says he) that the cataract, the sudden formation of which is very remarkable, was really a consequence of the injury, and not only so, but that the injury was the sole cause of the cataract, and did not operate merely in exciting a tendency already existing to opacity, we find similar appearances of *consensus* frequently in the corresponding teeth of the two sides, where no such decussation or nervous communication can be brought forward in explanation.

Notwithstanding this objection of Himly, it is generally acknowledged that those organs of the body are most apt to affect others, or in their turn to be affected sympathetically, in which the nervous system is most developed; that there are no organs between which a sympathy in different states of disease exists so remarkably as the two eyes: and that there are no organs in which the nervous system is more developed, none in which the nerves of the opposite sides are connected in the same intimate way.

In the cases now under our consideration, it is not improbable that the blood-vessels on the side of the injured eye, being in the state of fulness and morbid action which attend inflammation, communicate to those of the opposite side, with which they have connexions within the cranium, a disposition to the same state in which they themselves are. The ciliary nerves also of the injured eye may be the means of conveying to the third and fifth nerves an irritation, which may be reflected from the brain to the same nerves on the opposite side. I think, however, that the chief medium through which

sympathetic ophthalmia is excited, is the union of the optic nerves. The researches of modern anatomists have tended only to confirm the conjecture of Newton,[4] that the optic nerve of the one eye, proceeding backwards, and meeting the optic nerve of the other eye, the two mingle their fibres, and partially decussate. It is extremely probable that the retina of the injured eye is in a state of inflammation, which is propagated along the corresponding optic nerve to the chiasma, and that thence the inflammatory action is reflected to the retina of the opposite eye, along its optic nerve.

7. The history of the case will, in general, be sufficient to prevent any difficulty in the diagnosis. Sympathetic ophthalmia may be complicated with scrofula, and assume a good deal of the scrofulous character; or it may be complicated with syphilis, which an examination of the patient's skin and throat, and an inquiry into his previous health, will serve to elucidate. These complications, as well as the arthritic, will no doubt render the symptoms more severe; but they will scarcely influence the line of treatment to be followed.

8. The prognosis is so unfavourable, that it is our duty to guard the patient who has suffered any severe injury of one eye, against the exciting causes of sympathetic ophthalmia, from the very first. When this disease is actually present, even the most active treatment is generally ineffectual. Indeed, I have never seen an eye recover from sympathetic ophthalmia. Renewed attacks have generally terminated in extinguishing vision.

9. Rest, antiphlogistic means, and the use of mercury, are the principal points of the treatment. These means, we have abundant proof, are not very successful. Still, to relinquish these remedies, would be wrong.

There is a disease, Mr Wardrop informs us,[5] frequent in the eye of the horse, having the appearance of a specific inflammation, which usually first affects one eye, and then the other, and sooner or later destroys vision. It is known among some farriers, that, if the eye first affected suppurates and sinks in the orbit, the disease does not attack the other, or subsides if it had commenced in it. They have, therefore, adopted the practice of destroying the diseased eye, in order to save the other. They do this rudely, by putting lime between the eyelids, or thrusting a nail into the eyeball, so as to excite violent inflammation and suppuration. Mr Wardrop has frequently succeeded in saving one eye of the horse by adopting this practice; but he destroyed the eye by making an incision in the cornea, and discharging through it the lens and vitreous humour. "In some diseases of the human eye," says he, "where the disease makes a similar progress, first affecting one eye and then the other with complete blindness, the practice so successful in animals might, by judicious discrimination, be beneficially adopted."

The practice thus hinted at by Mr Wardrop has actually been adopted, though with a somewhat different view, by Mr Barton, of Manchester, in cases of injury of the eye with the fragments of per-

cussion caps. The reader will find an account of Mr Barton's mode of treating such cases at page 351.

Mr Crompton states,[6] that in one of the cases which he witnessed under Mr Barton's care, the vision of the uninjured eye was nearly lost from sympathetic inflammation, and adds that he thinks it most likely that the other cases would have terminated similarly, if the plan of laying open the injured eye had not been adopted. Mr Barton, it is true, opens the injured eye, with the view of extracting the fragment of the cap, on the presence of which he considers the sympathetic inflammation to depend. He not only opens the cornea, but cuts away a large flap of it. He then applies a poultice, and waits till the fragment is discharged. In the cases published by Mr Crompton, this practice appears to have not only relieved the patients of the pain they were suffering in the injured eye, but to have arrested the sympathetic ophthalmia which threatened the other. Is not this, then, good ground for adopting a similar plan, not only in cases where we have reason to believe that some foreign body is lodged within the eye, but even in other cases where the one eye being disorganized, and deprived of sight, the other eye seems likely to be destroyed by sympathetic inflammation? Where there is a suspicion of some foreign body being within the injured eye, there can be no question that Mr Barton's practice ought to be adopted; but even in other cases, why should we hesitate to lay open an eye in which vision is extinguished, if the operation affords a hope of our being thereby able to save the other?

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[1] Treatise on the Diseases of the Eye; p. 147; London, 1833.

[2] Morbid Anatomy of the Human Eye; Vol. ii. p. 140; Vol. i. p. 117; London, 1818, 1819.

[3] Himly und Schmidt's Ophthalmologische Bibliothek, Vol. ii. No. 3. p. 169; Jena, 1804.

[4] Opticks; query 15.

[5] Op. Cit. Vol. ii. p. 139.

[6] London Medical Gazette; Vol. xxi. p. 175.

SECTION XXXIV.—INTERMITTENT OPHTHALMIA.

At the period when I sent to the press the former editions of this work, although several interesting cases had been recorded of ophthalmia recurring in the same individual after longer or shorter intervals of time, yet I did not think there was sufficient ground to admit the existence of any disease of this kind so regularly periodic in its accession, as to warrant the appellation of *intermittent ophthalmia*.[1] Although I have since seen cause to change my opinion, the following remarks are still appropriate.

The pain which attends many of the ophthalmiæ, is undoubtedly subject to regular nocturnal exacerbations, but this does not entitle

these diseases to the appellation of intermittent. By an intermittent or periodical ophthalmia, I should understand one which recurred with considerable regularity at intervals of days, weeks, or months, and apparently not from accident, but from concatenation with the revolutions of time; whereas if we examine the generality of cases recorded as of this kind, we shall find that they are nothing more than instances of some particular ophthalmia recurring more or less frequently in the same individual, in consequence of his repeatedly exposing himself to the same, or to some similar exciting cause. The phlyctenular ophthalmia, being that which is most apt to be renewed on slight exposures, will also frequently appear to be periodic. The rheumatic, catarrho-rheumatic, and catarrhal may also, from their ready occurrence in eyes once affected with them, seem intermittent. I have frequently treated patients who, at intervals of three or four months, or once a-year, and nearly about the same season for several successive years, had suffered an attack of rheumatic iritis; but in every case of this kind, I have been able to trace the return of the disease to some new imprudence. In arthritic inflammation of the eyes there may also appear to be a periodic tendency, for every attack of that sort leaves the eyes worse than before, and with a strong disposition to suffer again from renewed causes of excitement.

These remarks, will, I think, be confirmed by a careful perusal of the interesting narratives of Dr Curry and Dr Bostock, both of whom had suffered from repeated attacks of severe ophthalmiæ.[2] Some other cases, published as illustrations of intermittent ophthalmia, seem to have been rather instances of neuralgia, attended, as this disease often is, with inflammation of some of the textures of the eye.[3]

The following case induced me to change my opinion regarding the non-existence of intermittent ophthalmia.

Case 235.—A gentleman came from a distance, to consult me, in July 1835. His age was 24, and he stated that he had been troubled with scrofulous ophthalmia till he was 10. After that age, he remained free from ophthalmia till within 10 months of the period when he consulted me. For these 10 months, the conjunctivæ had been affected with considerable redness, and this symptom presented exacerbations of a distinctly periodic character. The redness was of a carmine hue, and differed from that of any ordinary ophthalmia. The eyes were never entirely free from redness; but regularly every six or seven days, there was an exacerbation, first in the one eye, and then in the other. A patch of redness was first observed on one of the conjunctivæ, the redness spread rapidly till the whole membrane was affected, and then the other eye underwent the same process. Some swelling of the conjunctivæ attended these attacks, along with a degree of heat and pain in the eyes. There were no rigors, nor headach. There was not much intolerance of light. The blood-vessels of the conjunctivæ showed a tendency to pass over the edge of the corneæ. There were no phlyctenulæ, and no increased discharge from the conjunctivæ. The scleroticæ appeared neither thickened nor thinned. There was no affection of the corneæ, except some minute specks of opacity at the edge of the right one. There was no disease in either iris, and the vision was perfect. The attacks came to a crisis in about 36 hours from their commencement, the redness after this gradually decreasing till the eyes recovered something like their proper colour, and the whole process occupying generally six or seven days. There seemed, the patient remarked, to

be some cause residing in the eye itself which produced inflammation, exclusive of any external irritant, and which no care could counteract; for when the eyes were at the palest, he was sensible of a slight pricking sensation, the certain forerunner of another attack. Thus matters had gone on for 10 months.

The remedies which had been tried were leeches round the eyes; mercury, sulphate of quina, and arsenic internally; along with solution of nitrate of silver, solution of sulphate of zinc, and vinum opii, externally; all without effect. Venesection was now had recourse to, and seemed to do good for some time, but the benefit was only temporary.

The patient again consulted me in March 1838. His disease had continued with little change. Perhaps the intervals between the exacerbations were a little longer, approaching nearer to seven than to six days. There was now a remarkable increase of the opacity formerly observed at the edge of the corneæ. On each cornea there was now a sort of arcus, deficient above, but occupying to a considerable breadth the rest of the circumference. These rings were of a peculiar yellowish-white colour, so as to resemble pus or bone in appearance. They had been increasing for 18 months.

The patient had consulted several of the most eminent surgeons and oculists in these countries; but without deriving any benefit from their prescriptions. He had been cupped by the advice of one, and was using steel by the advice of another. My friend Dr Staberoh saw him along with me, and recommended a trial of iodine internally, with a tartar emetic eruption on the nape of the neck. The patient wrote to me, some time after, to say that these remedies had likewise been fruitless.

Such is the only case of distinct intermittent ophthalmia which has come under my observation. It corresponds with the cases seen by Benedict, in affecting only the external parts of the eye, and in manifesting the symptoms of a *taraxis*.[4] Its type is sextan. It corresponds with the disease described[5] by Staub as a congestion rather than an ophthalmia. This author would call it a local intermittent fever.

Case 236.—A gentleman, about 50, consulted me in December 1838. Both his conjunctivæ presented a very considerable redness, rather of a livid hue, and neither reticular nor zonular. The conjunctivæ looked as if they were dyed red, rather than inflamed. The redness was less on the upper half of the eyeballs than on the lower half, but the chief redness was on the temporal side. There was not much thickening of the conjunctivæ; and no chemosis. There was no morbid secretion; no glueing of the eyelids in the morning. There was no pain in the eyes, nor feeling of sand. A narrow white ring was observable between the sclerotica and cornea. The cornea, iris, and pupil of each eye were natural; and the vision perfectly good. The patient complained of a feeling of coldness in his eyes, which he relieved by heating them at the fire, a practice his medical attendants used to laugh at. They felt better, however, and the redness always diminished, when he passed into the open air. They became weak, if, after coming within doors, he used them in reading for half an hour, and the redness then increased. Gas light was pleasing, not painful, to them. They showed alternations of better and worse, but the exacerbations were not regular. If there was any intermittence, it was daily, the relief being experienced when the patient was out of doors in the forenoon. Winds, even the east wind, did not hurt his eyes.

The ophthalmia was of two months' standing. The patient had been long subject to neuralgic pains in the chest, back, and sides. Pulse 66. He felt no rigors, but rather a pleasing heat of skin. His skin was dry, and he perspired with difficulty, except on taking exercise.

In this case, diaphoretics and colchicum had been tried, with various local applications, but without any effect.

I understood the patient continued in the same state five months after I saw him. From the peculiar appearance of the eyes, I con-

sidered the disease to be essentially the same as that which existed in the preceding case, although the intermittent character was but obscurely declared.

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[1] The frequently recurring inflammation of the eye of the horse, which at last ends in *moon-blindness*, was formerly supposed to be periodic, and to be governed by the changes of the moon; but the notion is given up.

[2] History of a Case of Remitting Ophthalmia, and its successful treatment by Opium; by James Curry, M.D. in the Medico-Chirurgical Transactions, Vol. iii. p. 348; London, 1812. Case of a Periodical Affection of the Eyes and Chest; by John Bostock, M.D. in the same work, Vol. x. p. 161; London, 1819.

[3] See Hueter, in Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xii. p. 271; Vol. xiii. p. 93; Berlin, 1828, 1829.

[4] Benedict's Handbuch der praktischen Augenheilkunde; Vol. ii. p. 6; Leipzig, 1823.

[5] Zeitschrift für die Ophthalmologie, Vol. iv. p. 371; Heidelberg, 1835.

CHAPTER XIII.

DISEASES CONSEQUENT TO THE OPHTHALMIÆ.

Some of the consequences of the ophthalmiæ are direct; others are remote. Onyx, for example, or effusion of matter within the cornea, is a direct consequence of severe inflammation of the exterior textures of the eye; hernia of the iris is a remote consequence, which cannot take place till the cornea is penetrated by ulceration; while staphyloma of the iris and cornea is still more remote, never occurring till the process of cicatrization has formed a pseudo-cornea over the iris, exposed by partial or total destruction of the natural cornea, and, in many cases, not for a considerable number of weeks or months after such a formation is effected.

In all the cases falling under the head of diseases consequent to the ophthalmiæ, it is a question of importance, Is the ophthalmia subdued? If it is not, then the remedies which are indicated in the particular species of ophthalmia, which is still present, however long it may have continued, and however much it may have been neglected or mistreated, are, in all probability, the most likely means to remove also the consequences which the ophthalmia has produced. If, on the other hand, all active inflammatory symptoms are gone, and merely certain sequelæ remain behind, it is often necessary to try some mode of treatment totally different from what might have been pursued with advantage, had the disease still existed in the acute stage. To recur again to onyx and staphyloma, as illustrations, we have frequent opportunities of witnessing the complete

dispersion of the former by the employment of proper antiphlogistic means, while the latter is totally beyond the influence of any such mode of treatment.

SECTION I.—ONYX,[1] OR ABSCESS OF THE CORNEA.

The term *onyx* is employed to signify a deposition of pus, in the spongy substance, or between the lamellæ of the cornea. Such an abscess generally makes its appearance at the lower edge of the cornea, and, however small, may easily be distinguished from commencing hypopium, by its exact similarity in form to the white spot seen at the root of the nails. Even when the quantity of pus is more considerable, an onyx may be known by its superior limit being convex, and by its remaining unchanged in form and situation, whatever be the position of the patient's head; whereas when the patient has been for some time at rest in the erect position, hypopium presents a horizontal limit superiorly, although, upon motion, this form may be somewhat changed, by the matter gravitating to one or other side, according to the direction in which the head is moved.

Although the lower edge of the cornea is by far the most frequent seat of incipient onyx, it sometimes happens that pus is collected in a circumscribed spot over the pupil, or at any other part of the cornea, while, in other cases, we see onyx commencing, perhaps, above the centre of the cornea, and diffusing itself irregularly over a large extent. This is particularly the case with onyx originating in a variolous or a scrofulous pustule. Such an onyx is apt, instead of bursting through the exterior lamellæ, to infiltrate the substance of the cornea. After a considerable length of time, the matter is generally absorbed, and the corneal substance, which was separated by its presence, comes together again, adheres by means of effused lymph, and presents a peculiar variety of albugo, which seldom entirely disappears.

Onyx takes place most frequently in acute and neglected cases of the puro-mucous ophthalmiæ, and especially in the ophthalmia of new-born children. It occurs, not unfrequently, in catarrho-rheumatic, variolous, and traumatic ophthalmia; occasionally in phlyctenular ophthalmia; rarely in any of the others.

Under the use of the remedies most applicable to the particular ophthalmia in which it originates, incipient onyx is often removed by absorption, in the course of a few days, or even in a few hours. But, in neglected cases, more and more matter is effused, mounting gradually from the lower edge of the cornea, till it covers the pupil, separating the lamellæ, or, perhaps, rather infiltrating the substance of the cornea, till at length this part of the eye is completely put on the stretch, and looks like an abscess ready to burst. As the onyx increases, the pupil uniformly contracts, and becomes filled with lymph. The pain of the eye and head is at the same time severely

aggravated. At length, it occasionally happens that the posterior lamellæ of the cornea give way, and the matter falls down into the anterior chamber, so as to form a spurious hypopium. This very rare event is sometimes supposed to have taken place when in fact onyx is combined, as it not unfrequently is, in cases of catarrho-rheumatic and traumatic ophthalmiæ, with true hypopium. Much more frequently ulceration commences on the external surface of the cornea, and over the middle of the onyx; in the progress of ulceration, the cavity containing the pus is opened, and the matter is slowly evacuated. Not unfrequently the ulcer which has served to open the onyx goes on to penetrate completely through the cornea, so that the aqueous humour is discharged, the iris falls forward into contact with the ulcerated cornea, adhesion between them ensues, and the case ends in partial staphyloma. If a great part of the cornea is destroyed, the staphyloma will be total. The result, however, of the bursting of an onyx externally, is not always so unfortunate. It not unfrequently happens, that as soon as its contents are discharged, the inflammation begins to subside, the pupil clears, and, although some degree of leucoma is always left, it may be very limited, so that a fair degree of vision shall be preserved.

Treatment. The remedies most likely to subdue the ophthalmia in which the onyx has originated, must be carefully employed. Bleeding, nauseants, purgatives, counter-irritation, and mercurialization, besides their antiphlogistic powers, frequently appear to act favourably by promoting the absorption of the purulent effusion in these abscesses of the cornea. Belladonna ought to be used to counteract the tendency to contraction of the pupil. Warm anodyne fomentations are of great use.

Ought abscesses of the cornea to be evacuated by the knife? All agree that this ought never to be ventured on, when they are small, that is to say, when, having commenced at the lower edge of the cornea, they have, perhaps, not mounted higher than opposite to the lower edge of the pupil, in its medium state of dilatation. Larger onyces than this I have repeatedly opened with the lancet, and in every case in which I have done so, so much of the cornea was destroyed, that staphyloma was the result. I have, on the other hand, left onyces untouched, although they were so extensive as to cover the pupil completely, and have sometimes had the satisfaction of witnessing an almost perfect recovery of the eye. The following is a case which I treated on this plan :—

Case 237.—John Ferrie, aged 47, was admitted at the Glasgow Eye Infirmary, on the 22d May 1826, on account of catarrho-rheumatic ophthalmia of the left eye, with which he had been affected for about three weeks. For eight days he had had severe orbital pain during the night. There was an onyx, extending from the lower edge of the cornea so high as to cover the pupil, and over the middle of the onyx there was a small ulcer. The conjunctiva and sclerotica were very vascular. Vinum opii was dropped upon the eye, and extract of belladonna smeared on the eyebrow and lids. He was ordered to rub the forehead and temple every night with tincture of opium, to bathe his feet in hot water, and to take two grains of calomel with one of opium, on going to bed. On the 24th, he felt the eye better, although there was not much evident change in its appear-

ance. The iris was discoloured, and there was a lymphatic effusion into the pupil. He was ordered to take the calomel and opium morning and evening, to apply a blister to the nape of the neck, and to continue the other remedies. On the 27th, the mouth was affected, but the onyx had increased. Eight leeches were applied to the left temple; the morning dose of calomel and opium was omitted. On the 31st, the pupil appeared to be contracting. On the 2d of June, the upper part of the cornea was observed to be nebulous, and the eye felt more uneasy. The nitras argenti solution was applied in place of the vinum opii. By the 5th, the exterior laminæ of the cornea had given way, and a considerable quantity of matter had been discharged from the onyx. The pupil was still more contracted. He complained of a feeling of sand in the eye. He was ordered an aqueous solution of extract of belladonna, as a collyrium. On the 7th, the blister was re-applied. By the 9th, the aqueous humour had evacuated itself, and the iris fallen forward into contact with the cornea. The matter of the onyx had almost entirely disappeared, and he said he saw a little better. On the 12th, the pupil, still in contact with the cornea, appeared clearer, and vision was more distinct. On the 14th, a little aqueous humour was present between the upper part of the iris and cornea; the ulcer of the cornea was covered with lymph; and all the pus gone. On the 26th, the pupil was considerably larger, and clear; more aqueous humour was present between the iris and cornea. By the 30th, the pupil was clear, and of considerable size. A minute adhesion between the slight leucoma on the cornea and the lower edge of the pupil was observed, when the eye was examined laterally. The vision of the eye was good.

In this case, then, I left the abscess of the cornea to itself, and certainly no case could have been more alarming in its progress, nor more unexpectedly favourable in its results. The causes of such success as attended this case, I have endeavoured to explain at page 446.

In cases, however, where the abscess does not incline to open of itself, but appears to be about to involve the whole cornea, an artificial exit must be afforded to the matter, were it merely to save the patient from the continuance of the violent pain which attends this symptom. The incision may be made conveniently with the iris-knife, and ought to comprehend only the external laminæ of the cornea. At the moment of making the incision, no pus is in general discharged, but it forms in the course of some minutes a small drop, which is to be wiped away from the cornea. The operation, in most cases, requires to be several times repeated, before the onyx is entirely evacuated, and ought to be held out to the patient more as a palliative for the pain, than as a means of saving the sight, which, in such circumstances, is generally lost.

The effect of evacuating the aqueous humour in the early stages of onyx does not appear to be ascertained. Although by no means disposed to regard that operation as one frequently called for in the treatment of the ophthalmiæ, nor as one altogether free in itself from danger, I am willing to acknowledge that it must, at least for a time, relieve the tension which attends severe inflammation of the eye, and that as onyx makes its appearance only in severe cases, it might have a good effect upon this dangerous symptom. To trust, however, almost solely to this, or to any other local means, without assiduously combating, by general remedies, the ophthalmia in which the onyx has originated, would be highly improper.

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[1] Ὄνυξ, *the nail.*

SECTION II.—HYPOPIUM.[1]

Hypopium is a much rarer disease than onyx. We distinguish two varieties of it; the *true*, and the *spurious*.

1. By *true hypopium* is meant a collection of pus or of puro-lymph within the chambers of the aqueous humour, and most frequently within the anterior chamber, secreted by the lining membrane of the cornea, the iris, the capsule of the lens, or the ciliary processes. The most frequent sources of true hypopium appear to be the iris and the cornea. In true hypopium, the purulent matter is observed first at the bottom of the anterior chamber, and is thereby easily distinguished from the curd-like effusion of coagulable lymph which occasionally occurs in iritis, and drops down from the pupil in a considerable mass. So long as the patient remains at rest in the erect position, the superior limit of the matter in true hypopium constantly presents a horizontal line. In some cases, it is seen to shift its position, on inclination of the head from side to side; while, in other instances, it is so thick and glutinous, that it undergoes no change of this kind. It may increase gradually till it not merely covers the pupil, but fills the anterior chamber. If the case be neglected, the cornea becomes unnaturally prominent, and its substance being infiltrated with pus, it presents exactly the appearance of an abscess. At last, under an almost insupportable degree of pain, the cornea gives way; the pain now ceases, the iris, falling forward, adheres to the remains of the cornea, and staphyloma generally ensues.

It is rarely the case that we meet with true hypopium uncombined with some affection of the cornea, and this disease never proceeds to such a degree as to burst externally, unless complicated with onyx. Most frequently the collection of purulent matter remains nearly the same in quantity, not only for several days, but even weeks; during which time the iris becomes more and more inflamed, its motions more and more impeded, and at last, if the matter is absorbed, the pupil is found to be obliterated. When onyx or ulcer of the cornea is present along with true hypopium, there is much danger of the cornea being destroyed, and the case ending in staphyloma. This combination occurs not unfrequently in severe catarrho-rheumatic ophthalmia. In the ophthalmia occurring from injuries with the stalks or ears of wheat during harvest, I have repeatedly seen onyx with hypopium.

2. The name *spurious hypopium* is applied to a collection of pus in the anterior chamber, arising from the bursting of an abscess of the iris or of the cornea into that cavity. Abscess of the iris I have described at pages 463 and 468, and abscess of the cornea in the last section. Hypopium of this sort seldom, if ever, reaches to the lower edge of the pupil. When onyx, however, exists along with spurious hypopium, and bursts into the anterior chamber, this cavity may become completely filled with pus.

Treatment. The remarks, in last section, on the treatment of onyx, apply, with little variation, to that of hypopium. The inflammation must be combated by the appropriate means, and in its subsidence we must chiefly trust for the removal of the purulent effusion. Bleeding, calomel with opium, and belladonna will be necessary; and advantage may, in general, be reaped from the use of emollient fomentations, such as, an infusion of mallow flowers.

The giving exit to the matter of hypopium, by an incision of the cornea, is advisable, if the chambers appear filled, for we can never depend, in such a case, on absorption; while, by delay, we should risk the bursting, and complete destruction of the eye. Under such circumstances, we must regard the opening of the cornea as nothing more than a means of freeing the patient from excessive pain, and of preserving such a form of the eyeball, as may afterwards permit the application of an artificial eye.[2]

When the hypopium does not amount to such a quantity of matter as to fill the chambers of the eye, and especially when severe inflammation of the iris is present, opening the cornea might appear likely to aggravate the inflammation, increase the secretion of purulent matter, and expose the eye to protrusion of the iris. Notwithstanding these apparent objections, Mr Wardrop has recommended evacuation of the aqueous humour, as a remedy of much service, in the early stages of hypopium; and in cases of iritis, and of ulcer of the cornea, combined with hypopium, we have the testimony of Dr Monteath[3] in favour of a similar practice.

Dr Monteath recommends the incision to be made with the iris-knife, and to be two or three lines in length. This extent of incision is necessary, on account of the purulent exudation being thick, and sometimes even adherent, so that it will not flow out, but require to be extracted by forceps, or a small blunt hook. Dr M. mentions, that, after opening the cornea, and laying hold of a small filament of the matter, he has often been able to extract the whole *en masse*, which previously examined through the cornea, had every appearance of pus, but when extracted and examined, was in all respects similar to the exudation of puriform lymph, on the surface of an inflamed pleura or peritoneum. He observes, that when the hypopium is considerable, the operation, repeated again and again if necessary, checks the suppuration and ulceration of the internal surface of the cornea which invariably take place when the collection mounts as high as the centre of the pupil, and which is so apt to end in bursting of the cornea, and destruction of the eye.

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[1] *Hypopium*, from ὑπὸ, *under*, and πύον, *pus*. *Oculus purulentus*.

[2] Bidloo, Exercitationum Anatomico-chirurgicarum decas; Exerc. vii. de Oculo Purulento; Lugduni Batavorum, 1704.

[3] Glasgow Medical Journal; Vol. ii. p. 122; Glasgow, 1829.

SECTION III.—ULCERS, DIMPLE, HERNIA, AND FISTULA OF THE CORNEA. HERNIA OF THE IRIS.

1. There are two distinct varieties of ulcer of the cornea, the *superficial* and the *deep*.

The former generally extends over a considerable portion of the surface of the cornea, appearing often to destroy merely its conjunctival covering. The deep ulcer is commonly much less extensive, but affects the proper substance of the cornea, and often penetrates completely through it, so as to open the anterior chamber, and give exit to the aqueous humour. The superficial ulcer sometimes arises from slight mechanical or chemical injuries. It occurs much more frequently in the catarrho-rheumatic, than in any other of the ophthalmiæ. The deep ulcer of the cornea is generally the result of the bursting of a scrofulous phlyctenula or pustule, or may arise from an onyx bursting externally.

The superficial ulcer of the cornea discharges only a thin clear matter, its surface is slightly rough, its edges are, in general, very irregular, and so little raised above the level of the ulcer, that in many cases merely the conjunctiva of the cornea appears as if abraded. Not unfrequently we may observe an ulcer of this kind spreading from day to day at one part of its edge, and cicatrizing at another part. The cicatrice which follows such an ulcer is grayish or bluish-white, and semitransparent. It eventually clears. Sometimes it is from the first transparent, so that the appearance is as if a portion of the cornea had been sliced off.

The deep ulcer, on the other hand, is small, circular, and, by penetrating the laminæ of the cornea, one after the other, comes to present a funnel-shape. Its surface is usually ragged and covered with a sloughy-like matter, which assumes a white colour if touched by any lotion, or other preparation, containing sugar of lead. The same happens to the superficial ulcer, which becomes covered by an opaque cicatrice in consequence of the use of saturnine applications. Hence, in every case of ulcer of the cornea, these applications are totally inadmissible. The deep ulcer is apt to become covered with red vessels, before it heals up, especially if it be the result of any chemical injury. Deep scrofulous ulcer is sometimes attended with onyx. I have also seen a deposition of puriform lymph into the anterior chamber, from the lining membrane of the cornea, attend such cases. (See Case 218.)

The cicatrice which follows the healing up of a deep ulcer is generally opaque, but sometimes, from the first, transparent, so as to form a mere *dimple* in the cornea. When the cicatrice is opaque, the centre of it presents a yellowish-white colour, while the circumference is more of a grayish-white. Such a cicatrice or leucoma can seldom be completely removed.

2. There is one peculiar appearance of the cornea, which must not be confounded with these ulcers; namely, that state of it which

follows the absorption of a phlyctenula or pustule. The result of such absorption is a small *dimple*, still smoother and more transparent than the similar appearance which sometimes occurs after the healing up of a deep ulcer, being, in fact, covered by the conjunctiva, which has fallen down into the little depression, formed by the removal of the contents of the phlyctenula or pustule.

3. Occasionally it happens that the progress of a deep ulcer is arrested by the lining membrane of the cornea, or that this membrane, after having been penetrated by the ulcer, heals up, but, in either case, being unable by itself to resist the pressure of the aqueous humour, it is protruded through the ulcer in the form of a vesicle, constituting what is termed *hernia of the cornea.* This protrusion sometimes takes place to a very great extent, assuming a conical form, and rising so far above the natural level of the cornea, as with difficulty to be covered by the eyelids. We are obliged to remove it with the scissors, or destroy it by the application of lunar caustic; and what is very remarkable, a similar protrusion is apt to return again and again, even in the course of a few days after we have completely removed the preceding, till at length the cicatrized cornea attains a degree of firmness sufficient to support the aqueous humour.

4. When an ulcer fairly penetrates through the cornea, the aqueous humour is suddenly discharged, the iris falls forward, and but too often becoming engaged in the ulcer, protrudes through it, forming a small black point like the head of a fly, whence the name, *myocephalon*, which is bestowed on this *hernia of the iris.* The bit of iris, which protrudes, speedily adheres to the edges of the ulcer, and, as the inflammation subsides, contracts, and becomes covered by an opaque cicatrice. But should the inflammation of the eye increase after this accident, so that more of the cornea is destroyed, and more of the iris protruded, the latter, covered by a pseudo-cornea, is very apt to form a staphyloma.

5. Artificial wounds of the cornea, such as the section made for extraction of the cataract, sometimes remain long open, and threaten to become callous and fistulous. A perforating ulcer of the centre of the cornea may fall into a similar state, and allow the aqueous humour to drain away for a number of days. These may be considered as instances of *fistula of the cornea;* but the most remarkable affection of this sort occurs in the manner described at page 334.

Both kinds of ulcer of the cornea, but especially the deep, are usually attended by much intolerance of light, and a gush of burning tears on opening the eyelids.

The subjects of ulcer of the cornea, and especially of the deep ulcer, are rarely robust or in a good state of general health. On the contrary, they frequently present the indubitable signs of great weakness, and sometimes even of inanition. In emaciated infants, particularly, I have repeatedly seen the cornea of one or both eyes become thin and prominent, and give way, without much, and even

without any apparent inflammation. The wasted state of the body in such subjects arose from various causes, as chronic diarrhœa, cough following measles, and syphilis. In 1832, I saw several instances of the same destructive ulceration of the cornea, occurring after malignant cholera. I have sometimes been led to compare the state of such eyes to those of the dogs in Magendie's experiments, which being fed, or rather starved, on white sugar and distilled water, died from exhaustion, their death being preceded by perforating ulcer of the cornea and evacuation of the humours.[1] A similar state of the cornea, along with anæsthesia of the eye, sometimes arises from disease of the fifth nerve.

Treatment. In all cases we endeavour, of course, to check the ulcerative process, by those measures which are fitted for subduing the particular ophthalmia in which the ulcer has taken its origin. The girl, whose case I have related at page 423, was in a state of great debility in consequence of over-depletion. Within 24 hours, the tonic plan of treatment arrested the progress of a deep ulcer in the cornea. In chronic superficial ulcer, which often proves very tedious, calomel, given so as to affect the mouth, is sometimes necessary. In almost all cases of ulcerated cornea, counter-irritation will be found useful. As the inflamed state of the eye abates, the patient finds the pain greatly relieved. We now observe the ulcer losing its purulent appearance, and clearing, its edges becoming smooth, and beginning to contract.

It frequently happens, however, that the ulcer itself proves a principal cause of prolonging the inflammation of the eye. The flow of acrid tears, and the motions of the eyelids, constantly irritating the ulcer, keep it from healing, and greatly augment the attending ophthalmia. In such a case, there is one method of treatment[2] which is eminently useful, and that is the coating of the ulcer in such a way, that it shall, for a time at least, become insensible. This is generally effected by the application of lunar caustic, in solution or in substance, which kills the surface of the ulcer, and renders it able, for a time, to withstand the friction of the eyelids and irritation of the tears. This treatment is much superior, as an anodyne, to any sedative lotion, or even to any narcotic taken internally. In the interval of rest, the healing process is allowed to go on, and before the thin slough is thrown off, which is formed by the application of the caustic, we find that the ulcer has contracted. Were we to leave the case here, the ulcer would, in all likelihood again spread and penetrate into the cornea. As soon, then, as we observe that there is a renewal of pain and lacrymation, and that the ulcer is assuming a new degree of opacity and irregularity, the caustic must be re-applied.

In cases of superficial ulcer, the best means of applying the caustic is by touching the diseased surface with a hair-pencil dipped in a solution of from 4 to 10 grains of the nitrate of silver in an ounce of distilled water. Some prefer a solution of one grain of muriate

of mercury in half an ounce of water, to which is added an equal quantity of vinum opii.

The deep ulcer is better managed, in general, by sharpening a pencil of caustic, and touching the diseased surface with it for an instant. During this application, the upper lid is to be kept elevated, and before it is allowed to fall, a little water is to be dropped upon the cornea from a camel-hair pencil.

This use of caustic must be gone about cautiously, and had recourse to only when the ulcer betrays no disposition to heal of itself. Were it employed in every case of ulcer of the cornea, and in every stage, incalculable injury would no doubt often be done. Dr Jacob's observations on this subject are worthy of consideration. Speaking of the application of the nitrate of silver to ulcers of the cornea, he says, "When applied to such ulcers, either in solution or substance, it either adheres to, or becomes entangled in, the flocculent surface, and if this surface be not a slough and completely cast off, the nitrate of silver, rendered black or brown by exposure, becomes permanently fixed as the ulcer heals, and constitutes an indelible dark speck."[3]

The caustic is to be applied in the way above described, if hernia of the cornea be present, or if the cornea be completely penetrated, and hernia of the iris has taken place. In fistula of the cornea, also, after snipping off the projecting portion of conjunctiva, the opening is to be touched freely with the lunar caustic pencil. When a hernia of the cornea or of the iris projects much, it may also be removed with the scissors, and then the caustic applied. If the surface of the ulcer, or the piece of protruding substance, be just whitened by the action of the nitras argenti, it is, in general, enough. We ought never to continue the contact, so as to cause a slough of any considerable thickness.

When there is a deep ulcer over the pupil, it has been thought advisable to evacuate the aqueous humour, and to touch the ulcer with the solution of lunar caustic. In such cases, originating in traumatic, and in scrofulous ophthalmia, I have found great advantage from puncturing the cornea near its edge. Dr Monteath has recommended a somewhat different practice, and one which I regard as not nearly so safe.

"A deep scrofulous ulcer of the cornea, nearly penetrating into the anterior chamber, at which stage there is almost always pretty acute inflammation, assuming the vascular character, is very apt to induce iritis, and secretion of pus into the anterior chamber, forming hypopion. This is a state of considerable danger to vision, particularly if the ulcer be nearly opposite to the pupil; but, wherever it may be situated, I hardly ever fail to excite a healing action in the ulcer, and to give an immediate check to the hypopion and inflammation of the iris by the following treatment. The first and most important step, is to perforate the remaining layer, or layers, of the cornea, at the bottom of the ulcer, with an iris-

knife, and allow the aqueous humour to flow out, and the anterior chamber to collapse. The second, is to give a full dose of calomel and opium each night, till the mouth is, in the slightest degree, affected. The very first night after the puncture, the patient sleeps soundly, which he had been prevented from doing for several previous nights by violent supra-orbital and hemicranial pain. In a day or two after this trifling operation, the ulcer is completely filled with coagulable lymph, which even overlaps its border so as to put on the appearance, to an inexperienced surgeon, of the ulcer being much increased in size, whereas, it is the most favourable circumstance that could happen, because the redundant lymph is removed by absorption in a very few days. In proportion as the lymph, deposited in the ulcer, becomes organized, the integrity and natural size of the anterior chamber are restored. From the combined effects of the evacuation of the aqueous humour, and of the mercury, the iritis is rapidly removed, and the case now requires merely the ordinary treatment for scrofulous ophthalmia, attended with an ulcer on the cornea, which is one of the most common occurrences in ophthalmic practice."[4]

I regard it as an essential part of the treatment in all cases of deep, and even in the more severe cases of superficial ulcer, near the centre of the cornea, to apply belladonna, so as, if possible, to dilate the pupil. If this is neglected, the iris may readily advance into contact with the cornea, even when the ulcer is yet far from penetrating into the anterior chamber, and become adherent. The good effects of belladonna in freeing the iris, even after it had become involved in an ulcer of the cornea, is well illustrated by the case of James Tassie, which I have related at page 423. I have repeatedly witnessed the same happy result, under similar circumstances. In cases, however, where the iris protrudes near the edge of the cornea, belladonna appears rather to favour a farther prolapsus, and ought, therefore, to be avoided.

When we meet with an ulcer which has been touched with the acetate of lead, a remedy often recommended by ignorant people in cases of sore eyes, we ought with the small silver spatula, to endeavour to remove the white deposit which we find adhering to the surface of the ulcer, else it may become indelibly incorporated with the cicatrice, forming a peculiar chalk-like speck, which may never afterwards be capable of being removed either by absorption or operation. This attempt, however, must be made with great caution, lest we cause a large opacity of a different character, viz. from additional loss of substance of the cornea.

Prognosis. In all cases of deep ulcer, we ought to forewarn the patient of the opacity of the cicatrice, and the consequent deformity, and, it may be, abridgment, or even loss, of sight. Even when the ulcer is superficial, it is proper to pronounce a cautious prognosis; for, though the conjunctiva of the cornea is usually regenerated, so as not to impair the cornea's transparency, this is by no means always the case.

[1] Mémoire sur les Propriétés nutritives des Substances qui ne contiennent pas d'Azote, p. 7; Paris, 1816. See Case of Ulcerated Cornea, from Inanition, by Joseph Brown, M.D. in Edinburgh Journal of Medical Science; Vol. iii. p. 218; Edinburgh, 1827.

[2] Scarpa, Trattato delle principali Malattie degli Occhi; Vol. i. p. 280; Pavia, 1816.

[3] Dublin Hospital Reports; Vol. v. p. 367; Dublin, 1830.

[4] Glasgow Medical Journal; Vol. ii. p. 133; Glasgow, 1829.

SECTION IV.—SPECKS OR OPACITIES OF THE CORNEA—NEBULA—ALBUGO—LEUCOMA.

Specks of the cornea are distinguished by different names, according to the degree of opacity and density which they present, and according to the manner in which they originate.

1. *Nebula* is the slightest degree. It resides most frequently in the superficial layer of the cornea; occasionally it has its seat in the lining membrane; rarely in the proper substance of the cornea. A general nebulous state of the cornea is supposed to be sometimes the consequence of pressure merely, from preternatural increase of the aqueous humour. In some cases, it appears to be the result of serous effusion into the substance of the cornea; in others, to arise from fibrine deposited in the substance either of the lining membrane of the cornea, or of its conjunctival covering, or between one or other of these membranes, and the proper substance of the cornea. Nebula includes only those opacities of the cornea which are cloudy or hazy. This kind of speck is usually also extensive, and undefined, becoming less and less opaque toward its edges, and often affecting the whole cornea.

Nebula is a frequent consequence of puro-mucous ophthalmia, but its most common cause is scrofulous corneitis. The inflammation produced by inverted or supernumerary eyelashes, or inverted eyelids, and that arising from sarcomatous or granular conjunctiva, are also abundant sources of nebula. Depending on the latter causes, this opacity will require for its removal, the cure of the disease of the eyelid, and will not be at all benefited by any remedies directed against the state of the cornea merely. Whenever we find the upper half of the cornea nebulous, and especially nebulous and vascular, we may suspect the conjunctiva of the upper eyelid to be granular.

2. Whenever the effusion of lymph into any part of the cornea is so dense as to present a pearly appearance, the name of nebula is changed for that of *albugo*.

This sort of speck has its seat most frequently under the conjunctiva of the cornea. The lymph effused forms an opaque spot, generally circular or oval, more dense usually in the centre than towards the circumference, but in some rare cases presenting the appearance of a ring.

The common source of albugo is a phlyctenula or a pustule on the cornea, which has receded without bursting. Like every other abscess, these minute ones may be regarded as cavities formed by the exudation of coagulable lymph, and containing pus. The sphere of lymph which surrounds the pus appears to be formed for the purpose of limiting the extent of the disease. When the pustule disappears without bursting, the contained matter being absorbed, the sphere of lymph remains for a time, or, it may be, forms a permanent speck.

Another source of albugo is where the pus of an onyx is either absorbed, or evacuated by the knife. Onyx or abscess of the cornea is always attended by more or less lymphatic effusion; and after the pus is dispersed, the laminæ of the cornea which were separated by its presence are re-united by the process of adhesion, which cannot be accomplished without a new secretion of lymph.

Albugo may sometimes be observed with numerous red vessels running into it from the conjunctiva, and is extremely apt, when this is the case, to spread and to push across the cornea. This *vascular albugo* is occasionally very obstinate. It is always somewhat, and not unfrequently much and abruptly, elevated above the level of the cornea. The conjunctiva corneæ, through which the red vessels run, is much thickened. In some cases, these vessels are so numerous, as to make the albugo appear red, with patches of white in the interstices. We meet with this variety of albugo in scrofulous adults, and sometimes in children. The shrinking and disappearance of the red vessels which feed it afford ground to believe that the albugo will cease to spread; but it is rarely the case that the speck itself totally disappears. It is sometimes destroyed by spontaneous ulceration.

3. A third sort of speck is called *leucoma*, and is always the result of cicatrization. A loss of substance in the cornea by ulceration, and a partial filling up of that loss by granulation, always precedes the formation of leucoma, which indeed is synonymous with opaque cicatrice.

Leucoma may in general be known by its contracted and circumscribed appearance. Albugo is more diffused. Leucoma is often depressed at its centre, and is frequently combined with partial adhesion of the iris to the cornea.

Prognosis and treatment. All the three kinds of speck, *nebula*, *albugo*, and *leucoma*, have a natural tendency to disperse, as soon as the disease which has given rise to them, begins to subside; and that whether they depend on primary inflammation spreading to the cornea, or secondary inflammation of that part, arising from the irritation of inverted eyelashes or granular conjunctiva. We must, then, in every case endeavour to remove the ophthalmia, or the mechanical irritation on which the opacity depends, assured that if we succeed in this, nature by the process of absorption will sooner or later accomplish the whole amount of recovery which is possible. In children and young persons, many very dense and extensive

specks are removed in the natural progress of growth, which would be quite irremovable in adult life.

Demours is of opinion that the cornea grows from its circumference, and relates, in support of this idea, the case of a child, who, at the age of six months, had an inflammation of the eye, followed by abscess of the cornea, evacuation of the aqueous humour and adhesion of the iris to the cornea, near its edge. At the age of eight years, this adhesion was at the distance of a line only from the centre of the cornea, whence it follows that the growth of the cornea had taken place between the adhesion and the edge of the sclerotica.[1]

Leucomata clear at the circumference, and shrink towards the centre. If a leucoma be attended with adhesion of the iris to the internal surface of the cornea, in proportion as the clearing of the circumferential portion of the cornea proceeds, the iris comes into view, lying in close contact with the cornea, and as the growth of the latter goes on from circumference to centre, the iris is apt to be lacerated here and there, so that light penetrates through the torn places and reaches the interior of the eye, vision in some measure improving from this cause.

We are able, by various applications, to hasten the action of the absorbents in the removal of specks, especially if the applications in question be employed at the proper time. If we commence their use too soon, that is to say, before the cause of the opacity be subdued, we shall often not merely torment the patient unnecessarily, but actually impede the cure. For instance, suppose that in a case of albugo, arising from scrofulous corneitis, and still attended by a considerable vascularity, the practitioner forthwith began to attack the opacity of the cornea with stimulating powders, and solutions of irritating or caustic substances, not only would he fail in effecting his object, but run a great chance of rendering his patient totally blind. But if he began by combating the inflammation which still lingered in the eye, and that chiefly by constitutional remedies, not merely would he witness the dispersion of the redness, but he would find the cornea begin to clear, and day after day a little more of the effused lymph being removed, the patient's vision would proportionably improve.

It may be remarked that, in general, the internal and constitutional remedies which do good in cases of specks of the cornea, are those which operate in removing the ophthalmiæ in which the opacities have originated; and the same observation holds good in regard to the local remedies also. At the same time, there are both general and local means peculiarly adapted for hastening the absorption of opaque depositions in the cornea. Mercury is a general remedy of this kind. Some opacities yield only after the use of country air and generous diet.

When we find that the process of clearing has begun, we may often greatly assist it by such means as the following: a solution of from 2 to 10 grains of lunar caustic, or from 1 to 2 grains of cor-

osive sublimate, in an ounce of distilled water; vinum opii, pure or iluted; red precipitate salve, of various strengths; a finely levigated owder, consisting of 1 drachm of red precipitate, and an ounce of hite sugar. The powder is to be blown into the eye with a quill; ae salve is to be introduced behind the upper lid, and rubbed on the ornea by moving the lid with the finger in various directions; the blutions may either be dropped in by means of a camel-hair pencil, r injected over the surface of the eye with a syringe. One only f these applications is, in ordinary cases, used daily; but when ae eye is less sensitive to stimulants than common, one of them may e applied in the morning, and another at bedtime.

Besides the substances above enumerated, many others have been elebrated for removing specks. Mead recommended[2] equal parts f pounded glass and white sugar-candy, levigated into an impalpable owder. He thought this wore off the speck by its inciding quality. olutions of sulphate of zinc, sulphate or ammoniaret of copper, arbonate of potass, or sulphate of cadmium; hydriodate of potass, 1 solution, or in salve; the bile of various animals, bear's grease, nd the juice of the gryllus domesticus; walnut oil, and oil of lemon eel, have all had their advocates.

The solution of lunar caustic is regarded by many as specific for hose specks, which are removable by excited absorption, so that hey keep this solution ready by them for all such cases. Dr Ryan ecommends[3] an ointment of 1 drachm of nitrate of silver to 1 unce of axunge, as more efficacious and less painful than a ten- rains' solution. It will be found advantageous, however, to change he stimulant, after it has been continued for some time.

In all our endeavours to remove opacities of the cornea, it is ecessary to bear in mind that the points of importance are the eriod of the disease at which stimulants are likely to prove useful, nd the regular and frequent employment of the stimulating sub- tance or substances selected. The fact seems to be, that whether he substance used acts mechanically or chemically, it merely excites n increasing activity of the capillary vessels, which is followed by he absorption of the opaque deposition.

There are few cases of speck, which are not benefited by a blister kept open behind the ear, or on the back of the neck, and by re- eated scarifications of the conjunctiva of the lids.

I have often found vascular albugo intractable, unless the vessels running into the speck were divided, and the gums affected by the dministration of mercury. The best mode of dividing the fasciculus f vessels is to lay hold of a fold of the conjunctiva with a small air of hooked forceps, and snip it off with the scissors. If the nlarged vessels have escaped division in this way, a small hook may now be easily introduced beneath them, so as to raise them within grasp of the scissors. In children, this plan is generally impracticable on account of their resistance and the smallness of their palpebral aperture. Considerable bleeding follows this opera- tion, and ought to be encouraged by warm fomentations. A strong

salve of nitrate of silver, or of red precipitate, proves highly useful in vascular albugo.

The vulgar have a notion that specks can be removed by operation, but by medical men this has generally been regarded as impossible. Mead, indeed, speaks[4] of paring specks every day with a knife, and Darwin[5] of trephining them, while Dieffenbach[6] has actually cut out a leucoma from the centre of the cornea, and brought the edges of the incision together with sutures. Notwithstanding such high authorities, we may safely regard as generally impracticable any attempt to operate on specks of the cornea, except when the opacity is merely a crust of oxide or carbonate of lead deposited on the surface of an ulcer of the cornea, in consequence of a solution of acetas plumbi having been employed as a collyrium. It sometimes happens that such a crust remains after the ulcer is cicatrized, and I have repeatedly succeeded in lifting it off with the sharp point of a probe, leaving the cornea beneath nebulous merely, and susceptible of clearing completely under the continued application of vinum opii.

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[1] Traité des Maladies des Yeux; Tome i. p. 54; Paris, 1818. See Case 144.
[2] Medical Works of Richard Mead, M.D. p. 538; London, 1762.
[3] Transactions of the Association of Fellows and Licentiates of the King and Queen's College of Physicians in Ireland; Vol. iv. p. 257; Dublin, 1824.
[4] Op. Cit. p. 539.
[5] Zoonomia, Vol. iii. p. 71; London, 1801.
[6] Ammon's Zeitschrift für die Ophthalmologie; Vol. i. p. 177; Dresden, 1831.

SECTION V.—GRANULAR CONJUNCTIVA.[1]

In treating of the puro-mucous ophthalmiæ, I have repeatedly had occasion to refer to the thickened, fleshy, and rough state of the lining membrane of the lids and especially of the upper lid, which is known by the name of *granular conjunctiva*[2] and which is so frequent and so troublesome a sequela of those ophthalmiæ. At page 386, I have made some remarks on the sense in which the term *granular* is to be taken, and on the impropriety of calling the prominences of the conjunctiva which exist in this disease, *granulations*. I have stated, also, that I consider the prominences in question to be nothing more than the enlarged papillæ of the palpebral conjunctiva. These papillæ are visible under the microscope, although the conjunctiva is not injected; in a well injected preparation, they are visible to the naked eye. Whatever is the function of the papillæ of the natural conjunctiva,[3] whether they be mucous glands as Dr Müller, of Bensberg, thinks,[4] or nervous papillæ, as Dr Eble[5] considers them, the prominences which constitute the disease termed *granular conjunctiva*, are nothing more than these papillæ in a state of hypertrophy from inflammation.

The granular prominences vary in degree in different cases. In some, they are scarcely raised above the level of the conjunctiva; in others, the grains are as large as hemp-seeds. The seat of the granular prominences is the internal surface of the tarsi, and chiefly of the upper tarsus. The rest of the conjunctiva may present a red and swoln appearance; but is not really granular. Very often, there is a row of very prominent, pale and hard granules, at the posterior edge of the upper tarsus.

The conjunctiva in the granular state, secretes an inordinate quantity of mucus, which, on any additional irritation of the system, as from the use of spirituous liquors, or any local irritation, as from cold affecting the eyes, is apt to become again puriform. When this is the case, the contagious power of the original ophthalmia appears to return.

Rubbing against the cornea, the granular lids keep this part in a state of constant irritation, so that it becomes vascular and nebulous, particularly in its upper half. Should the case be neglected, great thickening, with roughness and total opacity of the cornea, may be the result. The cornea assumes somewhat of a greenish hue; viewed through a magnifying glass, it is seen to be dotted over with minute depressions; and it is covered with prolongations of the blood-vessels emerging from the recti muscles. Though the vasculo-nebulous state of the cornea, now described, is owing, in a great measure, to the granular condition of the eyelids, it would be erroneous to ascribe it entirely to this cause. It is, no doubt, partly an immediate result of the same inflammation, which has ended in hypertrophy of the papillæ of the palpebral conjunctiva.

In chronic cases of granular conjunctiva, the constitution becomes affected, the patient suffering from hectic fever, with paleness, emaciation, and almost a scorbutic state of the system. The frequent febrile attacks are always followed by increased redness, swelling and roughness of the conjunctiva. Under such circumstances, it is vain to attempt the cure of the local affection, unless the constitutional ailment is removed. When it is found impossible to remove this, the patient generally falls into phthisis pulmonalis.

Prognosis. Although by sufficient clothing, proper diet, restriction from intemperance, good air, and judicious medical treatment, the granular state of the lids, and opacity of the cornea, may, in general, be removed, and vision restored; yet, if the patient be guilty of intemperance, or be insufficiently protected from cold winds, or damp cold weather, relapses will almost certainly take place, attended by renewed inflammation of the conjunctiva and puriform discharge. Frequent relapses, especially in scrofulous subjects, may at last render this disease incurable.

Treatment. The treatment which I have found most successful consists in scarification of the conjunctiva, the application of escharotics, counter-irritation, and the use of tonics.

The eyelids being everted, so as completely to expose their internal surface, the scarification, if the conjunctiva is very vascular

and sarcomatous, is to be conducted as has been stated at page 360; if it is not so, each granular prominence is to be divided by a small crucial incision, or the membrane cross-hatched by slight touches of the lancet.

Next day, or two or more days after the scarification, according to circumstances, the lids being again everted as before, and dried from any of the gleety mucus with which they may be covered, the lunar caustic pencil is to be brought into a single rapid contact with the prominences which we wish to remove. Before allowing the lids to be replaced, a little warm water may be squirted over the surface which has been touched with the caustic.

It is advantageous after a time to change the lunar caustic for the sulphate of copper, which may be more liberally applied. The scarification and the caustic are to be employed alternately at intervals of two or three days. Escharotics and stimulants in solution, or in ointment, are also useful; as lunar caustic solution, strong lunar caustic salve, red precipitate salve, vinum opii, the expressed juice of the root of the holcus avenaceus, &c. These assist in clearing the cornea, as well as repressing the sarcoma of the conjunctiva.

During the employment of these remedies, a blister is to be kept open on the nape of the neck.

By continuing this plan of treatment with regularity for some weeks, I have often succeeded in removing granular conjunctiva after it had resisted a variety of other less methodical modes of treatment. The cure will be greatly promoted by attention to the dietetical adjuvants mentioned under the head of the prognosis, and by the use of tonics, especially sulphate of quina. Soldiers, after being discharged, are often cured of granular conjunctiva, in consequence of their going into the country, and there continuing the very same plan of treatment which had proved unsuccessful in a military hospital.

When the granular state of the conjunctiva has proceeded to a very great degree of exuberance, and continued for many months, notwithstanding a careful trial of the plan of treatment now explained, it may be necessary to have recourse to a more speedy and effectual method of removal, namely, by the knife.[6] The eyelid to be operated on is to be everted as completely as possible, and the layer of indurated conjunctiva is to be shaved off by means of a small and very sharp lancet-shaped knife, or dissected away with the scissors. The surface exposed by the operation is then to be touched with lunar caustic.

In performing the operation, it is necessary to beware of removing more than the mere granular layer. If more than this is taken away, hard and irregular cicatrices are left on the internal surface of the lids, the effects of which on the corneæ are scarcely, if at all, less prejudicial than those of the disease which has been removed.

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[1] *Trachoma. Pladarotes.*

[2] 'Hic affectus etiam *sycosis* seu *palpebra ficosa* dicitur, quia interna palpebræ

superficies ficus discissi adinstar granulosa evadit.' Plenck de Morbis Oculorum, p. 30; Viennæ, 1777.

[3] Soemmerring's Abbildungen des menschlichen Auges; Tab. ii. fig. 14; Frankfurt am Main, 1801.

[4] Erfahrungssätze über die contagiöse oder ägyptische Augenentzündung; Mainz, 1821.

[5] Ueber den Bau und die Krankheiten der Bindehaut des Auges; Wein, 1828.

[6] Sir William Read's Short but Exact Account of all the Diseases incident to the Eyes, p. 96; London, 1706.

SECTION VI.—CONJUNCTIVAL XEROMA OR XEROPHTHALMIA.[1]

Case 238.—Agnes Mackinnon, aged 26, applied at the Glasgow Eye Infirmary, on the 26th March 1833, under the following circumstances:—

The conjunctiva of both eyes was red, and had evidently suffered from long-continued inflammation. The right conjunctiva especially was of a dark red colour, and, where it passed from the lower eyelid to the eyeball, of an olive hue, from the frequent use of nitrate of silver solution.

The left conjunctiva had the appearance as if it were skinned over, being in many places of a whitish colour, and on the inside of the upper lid, looking as if it had suffered cicatrization. It was altogether drier than natural, and seemed almost destitute of its proper mucous secretion. The patient said that this eye watered much less than the right. At the nasal extremity of the left lower lid, there was a tendency to symblepharon; the conjunctiva, when the patient turned the eye upwards and outwards, forming a frenum, which prevented the free motion of the eye. There was slight inversion of the left eyelids, with some inverted eyelashes rubbing on the surface of the eyeball. Numerous red vessels were observed winding over the left cornea.

She said she had been subject to attacks of ophthalmia for eight years; the first attack being in the left eye, in consequence of a stroke with a shuttle. The conjunctivæ were never scarified, nor rubbed with solid caustic; and she never had any operation performed for the inverted state of the lids, except evulsion of the faulty eyelashes.

The inverted eyelashes were removed, and she was ordered to bathe the eyes thrice a-day with a tepid solution of 10 grains of muriate of ammonia and 20 grains of gum arabic, in 8 ounces of water.

The above is an example of a very peculiar state of the conjunctiva, the result of long-continued and ill-treated inflammation of that membrane. It has been described by Mr Travers, under the name of *cuticular conjunctiva*. He mentions,[2] that he had seen cases of this conversion of the conjunctiva into a rugous and opaque skin, go the length of knitting the lids close to the globe, and obliterating the sinus palpebrales. While he places it among the sequelæ of chronic inflammation of the conjunctiva, he considers it as immediately depending on an obliteration of the lacrymal ducts; a view of the subject previously taken by Schmidt, who describes[3] the disease under the name of *xerophthalmos*.

The most recent and complete account of this diseased state of the conjunctiva, we owe to Dr Ammon, of Dresden. He acknowledges, however, that the first case of the disease which he had an opportunity of examining, was pointed out to his attention by Professor Jäger, of Erlangen; who, in one of his clinical reports, had

spoken of this affection of the eye under the name of *Ueberhäutung der Conjunctiva.*

The principal symptoms of conjunctival xeroma may be gathered from the case of Mackinnon, as above related. I may add, however, a few remarks, imbodying what seems most interesting in Dr Ammon's paper.[4]

Symptoms. Although, in general, the conjunctiva presents a dark red colour, and has a thickened, rugous, and dusky appearance, it is sometimes whiter, and less vascular than natural. Even in the cases in which it is red, it bleeds much less than its colour might seem to promise, if we divide it with the lancet, with the view of taking away blood. It is always drier than in the healthy state, and looks as if it were skinned over. The caruncula lacrymalis has a dry, smooth, flat appearance, is sometimes whiter than natural, and is often so much shrunk, as to be scarcely recognisable. The puncta are generally contracted, or closed; sometimes, however, dilated and paralyzed. The cornea is dull and nebulous, with red vessels running over it. The eyelashes are few and dwarfish, and there is generally some degree of trichiasis, or of entropium. The conjunctiva often presents frena, which bind the lids unnaturally to the eyeball, and the fissura palpebrarum is shortened. Not unfrequently the conjunctiva is observed to fall into folds, around, and especially above the cornea. If the conjunctiva is touched with the finger, it betrays scarcely any sensibility. The Meibomian secretion is less than natural, or altogether wanting. The lids move incompletely. The patient complains of a feeling of dryness, and sometimes of sandiness of the eye. If he is excited to weep, no tears flow, but the eye becomes red and painful, while no such effect is produced in the sound eye. The sight is weak; but becomes somewhat stronger and clearer, if the patient wets his eye with saliva.

Causes. Long-continued inflammation of the conjunctiva always precedes conjunctival xeroma. In the course of the inflammation, it seems indubitable, both from the aspect of the membrane and the other symptoms, that the secretory structure of the conjunctiva is altered, and its power of forming mucus thereby partially or entirely lost. The kind of inflammation most apt to lead to this change in the conjunctiva is the scrofulo-catarrhal; but it may also follow any chronic conjunctivitis, scrofulous, catarrhal, or contagious. Dr Ammon suggests, that granular conjunctiva subsiding, is apt to leave the conjunctiva disposed to fall into xeroma. The one is an hypertrophy, the other is an atrophy of the mucous tissue. I am inclined to think, that the most frequent origin of this diseased state of the conjunctiva is either a totally neglected scrofulo-catarrhal ophthalmia, or one treated only with stimulants, such as red precipitate salve, nitrate of silver salve, and the like. Instead of abating inflammation of the conjunctiva by proper soothing and emollient applications, and by the local detraction of blood, it has unfortunately become a too common practice to use only stimulants and escharotics, and some of these so strong that they probably

destroy the mucous texture of the membrane to which they are applied, an effect followed, after some time, by the conversion of the conjunctiva into a mere cuticular covering. I have seen the mucous membrane of the tongue partially changed in the same way, so as to present numerous white, skinny, unalterable patches. Saturnine applications are, probably, in many cases, the cause of xeroma; for, if the least excoriation exists on the conjunctiva, the lead, precipitated by the muriatic acid which exists in the tears and conjunctival mucus, instantly fixes on the excoriated spot, renders it white and dry, and continues long or permanently adhering to it.

Dr Ammon, finding xeroma often attended by entropium, has come to the conclusion that the operation of removing a fold of skin, for the cure of the latter, may often be the cause of the former, the excision being made too deep, and the consequent inflammation extending to the lacrymal ducts. But it is a sufficient answer to this notion, that we meet (as in Mackinnon) with this disease of the conjunctiva, in subjects who have never undergone any such operation, and even in some who have had no inversion of the eyelids. That the lacrymal ducts are sometimes closed in xeroma, I do not mean to deny; on the contrary, I think there is good ground for believing that lacrymal and conjunctival xeroma are often conjoined; but may not the same chronic mismanaged inflammation, or the same violent escharotic applications, which destroy the secreting pores of the conjunctiva, close also the mouths of the lacrymal ducts? Would mere closure of these ducts, with an otherwise healthy conjunctiva, give rise to the disease now under our consideration? I believe not; and Dr Ammon seems inclined to the same opinion. It is the mucus of the conjunctiva and not the tears, which, under ordinary circumstances, keeps the eye moist and the cornea pellucid. The moisture of the eye and the clearness of the cornea are preserved even after the lacrymal gland is extirpated. But let the conjunctiva be deprived of its secreting faculty, not merely does the patient complain of a feeling of dryness in the eye, and move it with difficulty, but the membrane looks like the skin on the back of the hand, and the cornea, no longer guarded against the effects of air, dust, and light, becomes opaque. In one case, which fell under my observation, the conjunctiva corneæ presented an appearance as if it had been a piece of silk paper laid on the surface of the cornea.

Prognosis. The prognosis in conjunctival xeroma is bad. If the disease is not checked, blindness will be the result, from the cornea becoming dry and opaque.

Treatment. Dr Ammon found cold applications hurtful in this disease. Tepid ones should be used, and ought to bear some resemblance, in physical and chemical properties, to the secretion which the eye has lost, and which there is little hope of its recovering. The patient sees better when the surface of the cornea is moistened with some such collyrium as that recommended (page 84) for lacrymal xeroma. If the conjunctiva be very red, local blood-letting will afford considerable relief. The general health is

carefully to be attended to; not neglecting the trichiasis, entropium, and other occasional local attendants on this affection of the conjunctiva. Dividing the conjunctival frena is of no use.

[1] For an account of Lacrymal Xeroma or Xerophthalmia, see page 84.
[2] Synopsis of the Diseases of the Eye, p. 120; London, 1820.
[3] Ueber die Krankheiten des Thränenorgans, p. 55; Wien, 1803.
[4] Zeitschrift für die Ophthalmologie; Vol. i. p. 65; Dresden, 1830. Vol. ii. pp. 381, 412; Dresden, 1832.

SECTION VII.—ANCHYLOBLEPHARON AND SYMBLEPHARON.

A union of the edges of the eyelids, *anchyloblepharon*, and a union of the eyelids to the globe of the eye, *symblepharon*, are two diseased states which may occur either separately or together.

The edges of the lids may unite in their whole length, or only in part of their extent, and that generally at their temporal extremity. There is always more or less of an opening at their nasal angle. Symblepharon may also be complete or incomplete; the conjunctiva of the eyeball being united with the whole conjunctiva of one or of both eyelids, or a similar connexion existing only in a small extent. These modifications have considerable influence upon the prognosis and method of cure; less, however, than the following. It sometimes happens that the injured edges of the eyelids, or the surfaces of the excoriated or ulcerated conjunctiva, being left for a time in immediate and constant apposition, a close and intimate union takes place. It happens as often, however, that coagulable lymph is effused between the two edges or two surfaces, and, becoming organized, forms the bond of the morbid connexion. When the lids are united in such a manner, we find a whitish, uninterrupted, firm membrane, obliterating their natural opening; and when the eyeball is adherent to one or both lids in this way, the organized coagulable lymph presents itself in bands of almost tendinous texture, stretching from the one surface to the other. Sometimes there is only one band of adhesion, behind which the probe may be passed. These bands may be compared in some respects to those partial adhesions which are so frequently met with between the pleura which covers the lungs, and that which lines the chest; but in one respect they are essentially different, namely, that as the pleura is a serous membrane, these adhesions in the thorax may take place even upon slight inflammation, whereas the conjunctiva, following the laws to which all mucous membranes are subject, will never adhere in the manner described, so long as it continues entire. Were mucous membranes subject to the same conditions as serous membranes in this respect, the dangers to which life is exposed would be greatly increased, as adhesions between the opposite sides of all the hollow viscera would be continually taking place. Nature

has therefore provided that no mucous membrane can become adherent, so long as its surface continues entire; and accordingly we find that till it is wounded, or becomes excoriated or ulcerated, the eyeball never contracts adhesions to the eyelids. Indeed, ulceration of the cornea precedes almost every case of symblepharon. I have seen no case of symblepharon, in which the cornea was not more or less involved, and had not previously suffered from ulceration.

Causes. Anchyloblepharon and symblepharon are chiefly owing to such traumatic inflammations as arise from burns, or from the influence of escharotics; although any other ophthalmia, productive of excoriation or ulceration, may give rise to these consequences. They occur most frequently in those whose eyes have been injured by hot pieces of metal, boiling fluids, concentrated acids, or quicklime, and in those who, labouring long under some severe ophthalmia, and unable to suffer the light, or to procure medical assistance, have lain for weeks in the dark, with the eyelids constantly shut.

Prognosis. The prognosis is extremely various, and depends upon the possibility of completely separating the morbid adhesions, the chance of preventing them from returning, and the apparent or presumed state of the cornea.

The operation for anchyloblepharon can be performed with a reasonable hope of success, only when it is not complicated with symblepharon; or if the latter be present, when it is inconsiderable in extent, and does not involve the cornea. There are various means of ascertaining the facts. One is to take hold of a fold of the upper eyelid, and drawing it from the eyeball, desire the patient to move the eye as much as he can from side to side, and as if he were opening and shutting his eyes. By this means, we are likely not merely to discover the existence, but to ascertain pretty correctly the extent, of any adhesion between the eyeball and eyelids. A second means is the introduction of a small probe at the nasal angle of the lids. If there be no symblepharon, the probe passes on with ease to the temporal angle, whereas when adhesion exists, the opposition to the point of the instrument lets us know the situation and extent of the morbid connexion. A good deal may be ascertained also, by observing the degree of sensibility to light which remains. If the patient, with anchyloblepharon, be able to distinguish various gradations of light, it is probable that no morbid adhesion involves the cornea, and that this part remains transparent. If he distinguishes only the more considerable changes of light, while the slighter gradations escape him, we must operate in a degree of uncertainty regarding the state of the cornea. It may not be adherent, but is perhaps in some measure opaque. If there is no sensibility to light, we may conclude either that the adhesion extends to the whole surface of the cornea, and probably includes even a considerable portion more of the surface of the eyeball, or at least that the cornea, by the same inflammation which produced the anchyloblepharon, has been rendered completely opaque, and that

therefore the great object of an operation, namely, the restoration of sight, cannot be obtained.

We will, of course, recommend the patient to undergo an operation, when the case appears to be a simple anchyloblepharon, and we judge that the surface of the eyeball has either not suffered at all, or has suffered but little from the inflammation in which the anchyloblepharon has originated. On the contrary, when the sensibility to light is extremely indistinct or altogether wanting, or, even though the sensibility to light be pretty distinct, if the eyeball feels to the finger, through the eyelid, larger or smaller, harder or softer, than natural, or quite irregular on its surface, we will be cautious in recommending any operation, as the patient would thank us but little, if we merely brought into view a useless and destroyed eye, which had formerly been concealed.

There is one reason, however, which may sometimes lead us to operate for symblepharon, altogether independently of any hope of restoring sight. If the one eye is sound, and the other affected with this morbid union, the patient on attempting to look from side to side, experiences a disagreeable or even painful feeling of dragging in the eye affected with symblepharon, which restrains, in some measure, the exercise even of the sound eye. To relieve this, and with no view of restoring the sight, I have been solicited to separate the eyeball from morbid connexions with the eyelids.

It sometimes happens that we meet with symblepharon combined with staphyloma, and here also we may be obliged to operate without any reference to restoration of vision, which in such circumstances is entirely out of the question. The lids, bound down to the cornea, resist the growing staphyloma, and thereby cause a great degree of pain, which we relieve for a time by puncturing the eye; but the puncture soon closes, the staphyloma again presses against the lids, the pain and fever return, and to give permanent relief, we are forced, first, to operate for the symblepharon, and immediately after to remove the staphyloma.

Treatment. 1. The operation for *anchyloblepharon* requires to be performed somewhat differently, according as the eyelids are united immediately, or through the medium of a pseudo-membrane. If they are united immediately, and there is no sufficient aperture at their nasal extremity, for introducing a small grooved director, the assistant takes hold of the upper lid between his finger and thumb, so as to form a perpendicular fold, which he raises as much as possible from the eyeball, while the operator, with his left hand, does the same to the lower lid. With a scalpel the operator now divides the fold, which is thus formed, by a transverse incision, to the extent of 2 or 3 lines, exactly in the course of the natural opening of the lids. Through the incision thus made, the director being passed, and run along to the inner angle of the lids, the nasal portion of the anchyloblepharon is to be divided on the director, which is then to be shifted so as to allow the temporal portion to be treated in the same way. If the lids present a considerable opening at their inner

angle, the director is at once introduced through this, and the anchyloblepharon divided. After the central opening is made in the manner described, the rest of the operation may be performed with scissors.

When the edges of the lids are united by a pseudo-membrane, we perform, first of all, an operation similar to the above, only that we make the incision close to the edge of the lower eyelid, leaving the whole of the pseudo-membrane attached to the upper. Then laying hold of the membrane with a pair of forceps, we remove it completely with the scissors.

This may appear a very precise sort of operation; but the precision of the operation is nothing, compared with that which it is necessary to observe in the after-treatment. Our care may be said to commence at the moment when the operation is finished, for its success depends entirely upon our preventing the re-union of the separated lids, or, in other words, upon their edges becoming quickly skinned over, without much inflammation or suppuration. If this does not take place, they unite again either immediately, or by a new pseudo-membrane. In order to prevent this, we ought to perform the operation pretty early in the morning, after the patient has had a good night's rest, in order that he may be able to remain the longer without sleep after the operation, and thus any long-continued approximation of the eyelids be prevented. The edges ought to be besmeared with tutty ointment, and an assistant should sit by the patient during the first night after the operation, and frequently repeat the application. With all this care, some re-adhesion is still apt to form in the temporal angle, to prevent which, the patient should be awakened repeatedly during the night, and made to open his eyes as widely as he can, and this he should also do frequently in the course of the day. From day to day, the divided edges of the lids should be touched with lunar caustic, so as to prevent granulation, which is apt to lead to re-union.

Dr Schindler relates[1] a case which he cured by embracing the anchyloblepharon in two ligatures, which made their way through by the third day.

2. When a case of simple *symblepharon* presents itself, it is not difficult to determine whether we can undertake an operation with hopes of success. We see distinctly in what condition the cornea is, and can judge what will be the effects of dividing the morbid adhesions.

If the union be immediate, the assistant draws the upper eyelid upwards, and from the eyeball as much as possible, while the operator draws the lower eyelid downwards, in order that the united places being brought into view in their whole extent, and put on the stretch, may be the more easily and accurately divided. This is to be accomplished with a small scalpel. The external edge of the union is always the firmest part, the interior parts being much looser. During the separation, we must carefully avoid injuring the carti-

lages of the eyelids on the one hand, and the sclerotica and cornea on the other.

If the symblepharon exists through the medium of bands of organized coagulable lymph, after putting the parts on the stretch as in the last case, we must endeavour to cut away the bands as close to the eyeball as possible, and then laying hold of them with a pair of hooked forceps, dissect them cautiously from the eyelids.

All that has been said respecting the liability of anchyloblepharon to recur after the operation, is applicable to the present case, only that here it seems almost impossible by any contrivance to prevent the contact of the two raw surfaces. One of my pupils suggested to me an artificial eye, as the means most likely to answer the purpose of preventing re-union. I am afraid, however, that not even this could be borne, and that we must trust to the use of the collyrium and ointment above-mentioned, and to very frequent motion of the eye. Unless when the union is extremely limited in extent, we need not expect to perform the operation for symblepharon, without the re-appearance of some bands of adhesion, which will require to be removed by a second operation. Celsus confesses,[2] that he never saw any one cured by the operation; and states that Meges, who had tried it many times, avowed that he had never succeeded, but that the eyelids had constantly become again adherent to the eyeball.

Hildanus records a case of partial union of the upper eyelid to the eyeball, the consequence of a wound through the eyelid, with a sword, which at the same time touched the cornea and deprived the eye of sight. The patient was afraid of allowing the adhesion to be divided with the knife, lest the eye should be opened and the humours evacuated. As a probe could be passed behind the symblepharon, Hildanus surrounded it with a silk thread, to which he appended a small leaden weight. The symblepharon was divided by the pressure of the thread, between the eighth and ninth day.[3]

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[1] Ammon's Zeitschrift für die Ophthalmologie; Vol. v. p. 59; Heidelberg, 1835.

[2] De Re Medica; Lib. vii. Pars ii. Cap. 1. Sec. 2.

[3] Guilhelmi Fabricii Hildani Opera Omnia; p. 502; Francofurti ad Mœnum, 1646.

SECTION VIII.—SYNECHIA.[1]

The term *synechia* is employed to signify any morbid adhesion of the iris. When the adhesion is to the cornea, it is termed *synechia anterior*. This may result from a penetrating wound of the cornea, from ulcerative inflammation of that part, ending in perforation into

the anterior chamber, and escape of the aqueous humour, and even from inflammation of the cornea or iris, without any perforation of the former. When the adhesion is to the capsule of the crystalline lens, it is termed *synechia posterior*. This is a frequent consequence of iritis.

In synechia anterior of limited extent, the adhesion may sometimes be separated by means of a needle introduced through the cornea, or the adherent part may be cut across, as I shall explain more fully under the head of *Artificial pupil*.

In synechia posterior, even when apparently the whole circumference of the contracted pupil is embraced in the adhesion, it sometimes happens in the course of months, or years, that a minute portion of the edge of the pupil becomes free, and a restoration to vision unexpectedly takes place.[2] In the case of an old man about whom I was consulted, a separation of this kind seemed to have happened to the whole circumference of the pupil, 20 years after the iritis which closed that aperture. It is probable that the vitreous humour having dissolved, the lens, enclosed in its capsule, had fallen down behind the iris, as after the patient's vision was suddenly restored, the pupil appeared somewhat dilated, and the iris tremulous.

Laceration or absorption of the iris near its great circumference is another phenomenon which we occasionally witness, in anterior or posterior synechia. The iris is on the stretch, and gives way or is absorbed, at one or more points, so that vision is improved. According to the number of holes which have been formed, vision is sometimes rendered double, or triple.

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[1] Συνίχια, *continuity*, from συνίχω, *I hold together*.

[2] Siemerling's Merkwürdiger Fall einer vieljährigen von der Natur zweimal gehobenen Blindheit eines 92jährigen Greises; Berlin, 1818.

SECTION IX.—OBLITERATION OF THE PUPIL.

It has been fully explained in the 17th and following sections of the preceding chapter, that in consequence of inflammation of the iris, the pupil is apt to become narrowed, misshapen, fixed, and filled with coagulable lymph, a state of parts to which the terms *phthisis pupillæ*, *atresia*[1] *iridis*, and *synizesis*[2] have been applied.

Woolhouse attempted with a needle, introduced through the sclerotica, to divide the whitish fibres which bind down the iris, and to open up the closed pupil, an operation which he termed *diæresis*.[3] Its want of success probably led Cheselden to the idea of forming an artificial pupil. Woolhouse was afraid to touch the uvea or the iris with the needle. Cheselden freely divided these parts, and his boldness and ingenuity were crowned with success.

The use of belladonna in cases of closure of the pupil ought not to be hastily abandoned. The filtered aqueous solution, dropped upon the conjunctiva once or twice a-day, and continued for several months, is often followed by some degree of dilatation of the pupil, and considerable improvement in vision. The internal and long-continued use of iodine also appears to be useful.

Dr Lorch relates[4] an interesting case of synizesis, accompanied by three separate protrusions of the iris through as many ulcers of the cornea. The closure of the pupil was complete, and the eye thereby deprived of sight. As the prolapsed portions of the iris shrunk and the ulcers healed, the pupil opened, and vision was restored.

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[1] From *α negative*, and *τιτρώω, I perforate.*

[2] *Συνίζησις*, from *συνίζειν, to sit together.*

[3] Mauchart, De Pupillæ Phthisi ac Synizesi; in Haller's Disputationes Chirurgicæ Selectæ; Vol. i. p 468; Lausannæ, 1755.

[4] Ammon's Zeitschrift für die Ophthalmologie; Vol. v. p. 40; Heidelberg, 1835.

SECTION X.—CATARACTS, OR SPECKS OF THE CRYSTALLINE CAPSULE AND LENS.

The origin of these sequelæ of ophthalmia has been fully explained in those sections of the last chapter, which treat of iritis and inflammation of the crystalline lens and capsule. When once fairly confirmed, no means of cure are of any avail except the removal of the opaque body by an operation.

SECTION XI.—OPACITIES OF THE HYALOID MEMBRANE.

I have seen three or four cases of opacities, which I judged to be the effects of hyaloiditis, or inflammation of the vitreous capsule. They were generally striated, or ramose, and presented a funnel shape. In one case, I was surprised to find the patient able to read with the affected eye.

I lately operated on a patient, who for a time presented a funnel-shaped striated opacity, apparently at a considerable depth behind the lens of each eye. The case ended in lenticular cataract. There was nothing peculiar in the appearances of the extracted lenses; the deep seated opacity was no longer visible after the patient recovered; and she saw perfectly. The apparent depth of the striated opacity must have been an optical deception.

SECTION XII.—DISSOLUTION OF THE VITREOUS HUMOUR.

This has been styled *synchesis*,[1] and is in fact a disorganization and solution of the hyaloid membrane. It is totally incurable, and becomes sooner or later to be accompanied by amaurosis. Whether the boggy state of the eyeball, referred to at page 480, depends on dissolution of the hyaloid membrane, or merely diminution of its contents, remains to be ascertained by dissection. When the vitreous capsule is dissolved, it by no means necessarily follows that the eye should feel soft or boggy. On the contrary, it often feels harder than natural, owing probably to a superabundant quantity of fluid occupying the place of the vitreous humour.

[1] Σύγχυσις, *commixtion*, from συγχύω, *I pour together*.

SECTION XIII.—ATROPHY OF THE EYE.[1]

Some severe or long-continued ophthalmiæ, occurring in childhood, impede the natural growth of the eye, so that it remains through life of less than the average size; or, attacking the adult, they are followed by an unnatural absorption, or an imperfect regeneration, of the contents of the eyeball, and a shrinking of its coats. We often see the cornea, and sometimes the whole eyeball, continue dwarfish, after the scrofulous varieties of ophthalmia, and after inflammation, excited by injuries of the eye, in scrofulous subjects. I have seen the eye shrink to less than half its size from Egyptian ophthalmia, the pupil remaining open, though not larger than a pinhole, and the cornea greatly contracted, yet still clear. The person saw none with the eye in this state. In cases of syphilitic iritis, it sometimes happens, that after mercury has caused the absorption of effused lymph, or of those tubercles which rise upon the surface of the iris, there follows, in consequence of the altered state of the internal parts of the eye, an unnatural absorption, producing flaccidity and wasting of the bulb, which, under these circumstances, assumes a square form, being depressed opposite to the insertion of the four recti muscles, while the pupil closes, the cornea shrinks and becomes opaque, and the eye sinks back in the orbit. In such cases the atrophy extends to the optic nerve, and may sometimes be traced, on dissection, involving the opposite tractus opticus as far as the corpora quadrigemina.[2] Arthritic iritis is also frequently followed by atrophy of the eye.

It is not in scrofulous subjects alone that traumatic ophthalmia is liable to be followed by atrophy. Nor is it necessary that the injuries should be severe, to produce this effect. Even the wound produced by the introduction of a couching needle is not unfrequently

followed by such inflammation, as destroys the secreting powers of the eye, so that the regeneration of the humours is impeded, and the organ shrinks.

In all degrees of atrophy of the eye, the prognosis is unfavourable. Even when there is as yet no apparent diminution in the size of the eye, if the cornea or sclerotica be more than naturally flexible, a symptom denoting an atrophic tendency, we generally find, on careful examination, that the retina is imperfectly sensible. Operations upon such eyes, and still more upon those which have shrunk below their natural size, are rarely attended with success. The same holds with regard to congenitally atrophic eyes, affected with cataract.

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[1] *Phthisis oculi.*

[2] Cloquet, Pathologie Chirurgicale, p. 132, pl. x. fig. 4, 5, and 6; Paris, 1831.

SECTION XIV.—STAPHYLOMA.

Various protrusions, generally from the front of the eye, and caused by morbid changes in the texture, and by a yielding of its coats, have received the name *staphyloma*, from the resemblance which they occasionally bear to a grape.[1]

§ 1. *Staphyloma Uveæ, or Iridoncosis.*[2]

Those who are conversant with the diseases of the eye must have observed the peculiar state of the iris consequent to iritis, which Professor Jäger, of Vienna, designates by the name of *staphyloma iridis*, and to which Dr Klemmer proposes[3] to apply the appellation of *iridoncosis*. The anterior surface of the iris, in the diseased condition to which these names are applied, has at one or more spots lost its natural colour, being blackish, or even presenting a hue so deeply black, that we might suppose the iris to have been absorbed at the part affected, or a piece of it cut out for the formation of an artificial pupil. (*Fig.* 57.)

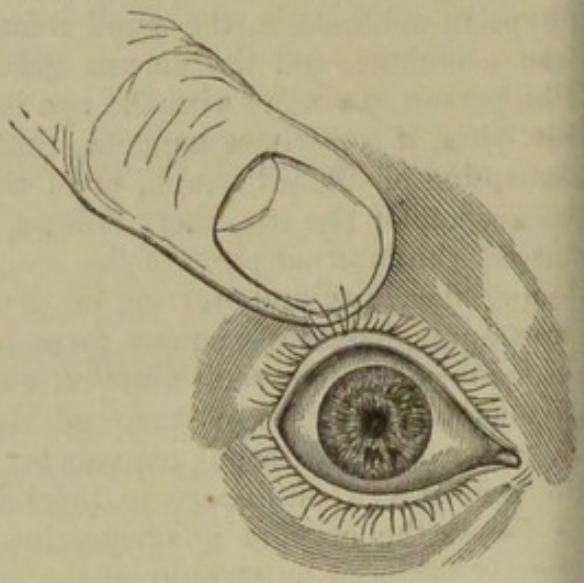

Fig. 57.

Jäger's pathology of this state of the iris is very different from that of Klemmer. Both are agreed that it is one of the sequelæ of chronic, and generally of some specific, iritis. In consequence of inflammation, Jäger thinks the iris loses its natural firmness of texture, and becomes

preternaturally adherent to the subjacent uvea. Next, he believes the aqueous humour of the posterior chamber presses the uvea forwards through the attenuated iris, and that thus the staphyloma iridis is formed. *Staphyloma uveæ* would be a more correct appellation, and would serve to distinguish this affection from a protrusion of the iris through the cornea. Jäger has not himself published on the subject; but, in the account of his doctrine furnished by Dr Froriep,[4] and referred to by Klemmer, no notice is taken of the influence which the contracted and adherent state of the pupil is likely to have in the case in question, in promoting the pressure forwards of the uvea by the aqueous humour, in consequence of this fluid not being permitted to flow in what is generally regarded its natural course, namely, through the pupil into the anterior chamber.

That, in such cases as Jäger designates by the name of staphyloma iridis, the iris is not actually absorbed in its whole thickness, is proven by the want of sight, and by the fact that, under the circumstances in question, he has formed an artificial pupil with success.

Klemmer proposes *iridoncus* or *iridoncosis* as an appropriate name for this sequela of iritis, which he contends is not a thinning but a thickening of the iris; not a shining through of the uvea, but a deposition of coagulable lymph in the parenchyma of the iris. The proofs he gives of this opinion are incomplete; and no less so is his refutation of Jäger's doctrine on the subject. For any thing yet established, each of these conditions of iris may occasionally occur. Which is the more frequent, and by what marks they are to be distinguished, must be left for future inquirers to determine, and especially for those who shall have opportunities of dissecting eyes affected with the consequences of iritis.

Sometimes the black discoloration exists in small insulated points; in other instances, the whole iris is affected, except towards the pupil, where the iris generally preserves its natural texture. Sometimes the black colour forms a narrow ring, close to the great circumference of the iris; in other cases, it presents a triangular form, the basis of the triangle being turned towards the ciliary, and the apex towards the pupillary margin of the iris. The surface of the affected part may be uniform or undulating; it often presents a striated appearance, from the vessels or nerves passing through it; the colour is not always black, but is sometimes gray or bluish white, or blackish blue.

Klemmer relates only one dissection, and that not of the human eye, but of that of the ox.

§ 2. *Staphyloma of the Iris, or Staphyloma racemosum.*[5]

A portion of iris protruding through a wound of the cornea, as, for instance, the incision made for the extraction of cataract, is sometimes styled a *staphyloma iridis;* but, in general, this term is reserved to protrusions arising from partial or general destruction of the cornea by abscess and ulceration. From whatever cause it may arise, the appropriate name for such a protrusion would be *staphy-*

loma iridis per corneam. There may be a single protrusion of this kind, or there may be several, for it sometimes happens that the cornea is perforated by ulceration, not in one point alone, but in many, and that through the openings thus formed, the iris, protruding, gives rise to an appearance somewhat like a cluster of berries, (*Fig.* 58.) whence the name *staphyloma racemosum*. The protrusions of the iris generally present a dark colour, and a smooth glistening surface. One or more of them occasionally give way, and allow the aqueous humour, by which they have been over-distended, to escape. The staphyloma consequently becomes flat, and may disappear altogether, the cornea cicatrizing over the seat of the former protrusion. It sometimes happens that this sort of staphyloma meets with an accidental cure, a blow bringing on inflammation, which ends in atrophy of the eye. In other cases, the staphyloma of the iris degenerates into staphyloma of the cornea and iris, the exposed iris becoming covered by a cicatrice, or pseudo-cornea, so that the front of the eye assumes a white, opaque appearance, but still presents an unnatural projection.

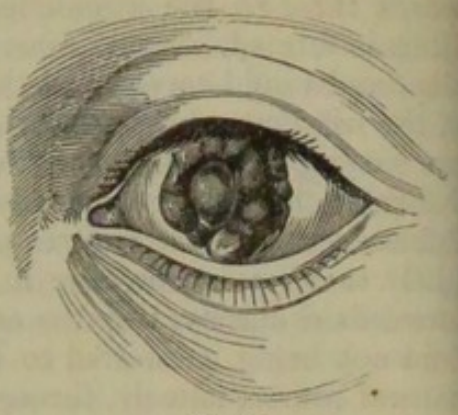

Fig. 58.

Prognosis and treatment. If any considerable portion of the cornea be in a natural state, it may be possible to form an artificial pupil behind that portion, after the staphyloma of the iris is removed, which is sometimes effected by puncturing the individual protrusions with the point of a cataract-needle, and touching them with the lunar caustic pencil. If more considerable, they may be snipped off, and the place touched in the same way. When the whole cornea is affected, nothing can restore vision. The staphyloma may be punctured occasionally, or removed entirely by the knife, exactly as a total staphyloma of the cornea and iris is removed, which will be followed by a flat and opaque cicatrice or pseudo-cornea, adherent to the capsule of the lens.

§ 3. *Staphyloma of the Cornea and Iris.*

A *staphyloma corneæ et iridis*, as it is technically termed, is nothing else than a cicatrice, spread over the iris, and adhering to it, occupying the place and presenting somewhat of the form of the cornea, but totally opaque. This cicatrice is generally much thicker and denser than the natural cornea; often, indeed, of a consistence almost cartilaginous. A staphyloma of the cornea and iris is not so much a degeneration of the old cornea, not so much an opaque and thickened state of those textures which were formerly thin and transparent, as a new and morbid product, occupying the place of that portion of the cornea, which had been destroyed by abscess and ulceration. If an onyx gives way, and the cornea is perforated, but without any extensive ulceration round the perforation, partial sta-

phyloma will probably be the result. If around the perforation, even when it is small, there takes place extensive and deep ulceration of the laminæ of the cornea, so that it is much thinned, total staphyloma will generally ensue. If the whole thickness of the cornea is destroyed by abscess and ulceration, and in its whole extent, still more certainly will total staphyloma be the consequence.

To the inner surface of the cicatrice or pseudo-cornea, the iris is always adherent. A mere opacity of the cornea, in consequence of inflammation, never produces staphyloma. The iris, as has been explained in a preceding section, sometimes adheres to the internal surface of the cornea, from inflammation; but neither does this *anterior synechia*, as it is termed, ever end in staphyloma, unless part of the cornea has actually given way and been destroyed. It is not adhesion of the iris to the cornea, but it is a covering up of the exposed iris by a new substance altogether, which lays the foundation for staphyloma, and constitutes an essential character of the disease. This is a point which has been illustrated in a masterly manner, and established beyond controversy, by Mr Wharton Jones.[6]

This kind of staphyloma is styled *partial* or *total*, according as it involves a portion only, or the whole extent of the cornea and iris. The most evident symptom is an opaque projection in the situation of the cornea, of a bluish, greenish, or white colour. If the destruction of the cornea and consequent protrusion of the iris have been limited, the staphyloma is partial; but if the whole or greater part of the cornea has been destroyed, the whole iris is pushed forwards by the pressure of the vitreous humour and lens from behind, and the staphyloma is total. In the former case, the protruded iris becomes covered with a cicatrice, which is continuous with the portion of the old cornea which remains, and which preserves its transparency. In the latter case, the iris is protruded in the form of a round tumour, and gradually becomes covered by an opaque cicatrice, embracing the whole extent of the natural cornea.

Causes. Small-pox being extremely apt to produce extensive onyx, ending in bursting and ulceration of the cornea and protrusion of the iris, staphyloma was a much more frequent occurrence before the general introduction of vaccination than it is at present. The ophthalmia of new born children, the contagious or Egyptian ophthalmia, and severe scrofulous ophthalmia, are the most common causes of staphyloma at the present day.

1. *Partial staphyloma of the cornea and iris*, being generally the result of an onyx of limited extent, occupies, in nine cases out of ten, the lower part of the cornea. (*Fig.* 59.) It is generally of a white colour, the pseudo-cornea being often very thick and dense, and it is less susceptible of increase than total staphyloma. In those cases where it does not cover nor involve the pupil, the patient is able to see with more or less distinctness

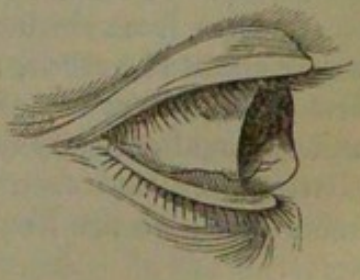

Fig. 59.

those objects which are placed above him or on a level with his eye, but he is generally affected with epiphora, and painful sensibility of the organ. In more unfortunate cases, the whole edge of the pupil is adherent to the opaque and projecting portion of the cornea, and the patient can recover a degree of vision but by the formation of a lateral artificial pupil. It sometimes happens, however, that a partial staphyloma, occupying the centre of the cornea, and involving the whole edge of the pupil, contracts in time to such a degree, that the iris at one or more places gives way, or is torn from the choroid, so that one or more false pupils are formed, through which the patient obtains some accession of vision. In other cases, central partial staphyloma goes on projecting more and more, and ends at last in total staphyloma.

Leucoma and anterior synechia are sometimes mistaken for partial staphyloma, although by a careful examination of the eye this mistake may always be avoided. To the whole extent of the protuberant part of a partial staphyloma, the iris is firmly adherent, so that the anterior chamber is much diminished in size; whereas, in simple leucoma, the iris is not at all adherent to the cornea, while in synechia, though the cornea is opaque and the iris is adherent to its internal surface, there is no unnatural elevation or protrusion. In partial staphyloma, the whole cornea partakes in some measure of a conical form, the termination of the cone being at the centre of the staphyloma; whereas in leucoma and synechia, the general spherical form of the cornea remains unaltered, the opaque portion being scarcely perceptibly raised above the level of the rest of the cornea, and not unfrequently depressed.

The degree of vision which patients with partial staphyloma often possess, may readily be lost, either by inattention on their part, or by injudicious attempts to remove or lessen the disease. When neglected, the tumour is apt to increase in size till it projects from between the eyelids, so that it is constantly irritated, and soon becomes inflamed, from contact with their edges, the eyelashes, and foreign bodies. In these circumstances, the patient ought to submit to such treatment, as, if carefully conducted, shall not only improve very materially the form of the eye by lessening the staphyloma, but save the remaining sight. The patient, however, must be informed that notwithstanding the removal of the partial staphyloma, it will be impossible for him to recover the transparency of the cornea in the part affected. After the most successful treatment, a very visible, white, but flat cicatrice, will remain.

If, either from closure of the pupil, or from the partial staphyloma being situated over it, and involving it, no vision exists, we must, first of all, direct our attention to the diminution of the staphyloma, and removal of the pain and irritation by which its increase in size is attended; and then determine whether, by an operation for artificial pupil, we are likely to gain for the patient some restoration of sight.

If a partial staphyloma is very dense and white, it cannot be

lessened by any practice. It is only by means of a gradual, moderate, and repeated inflammatory process, that other cases of partial staphyloma can be improved, without endangering the general form of the eye and the remaining degree of vision. The inflammation is to be excited by the cautious use of escharotics, continued till such a contraction and firm cohesion are produced in that part of the cornea which is adherent to the iris, that it shall be able to resist the pressure of the aqueous humour. The escharotic most frequently employed for this purpose has been the muriate of antimony, commonly called *butter of antimony*. The point of a camel-hair pencil being dipt in this preparation, and the eyelids held widely separated, the apex of the staphyloma was touched with the pencil till a small white eschar formed. Before allowing the lids to close, the surface of the staphyloma was washed with a large camel-hair pencil dipped in milk. Probably the same object might be better effected, after puncturing the apex of the staphyloma with a cataract needle, by touching it with a pointed pencil of caustic potash, or of nitrate of silver. The repetition of the caustic is not to take place till the eschar has separated, and the inflammation caused by the former application subsided.

2. *Total staphyloma* appears under two different forms, the discrimination of which is necessary both for the prognosis, and the technicism of the operation, which total staphyloma so frequently requires. In the one the tumour is *spherical;* in the other, it is *conical.*

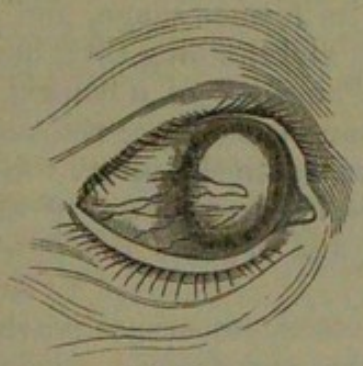

Fig. 60.

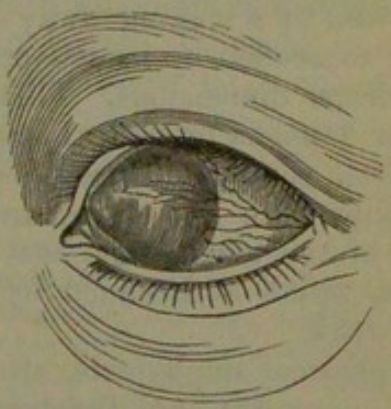

Fig. 61.

In the *spherical* staphyloma, (*Fig.* 60.) the anterior chamber is abolished; the posterior continues to exist. In the *conical*, (*Fig.* 61.) both chambers are obliterated. I may also mention, that in the spherical, the lens is generally transparent; in the conical, it is opaque or is awanting, having escaped through the cornea. In the spherical, the vitreous humour is generally healthy; in the conical, it is very often dissolved.

As by the abolition of both chambers, the secretion of the aqueous humour must be entirely prevented, we can easily explain, in the first place, why the conical staphyloma never reaches the great size which is frequently attained by the spherical. In the spherical variety, the posterior chamber remaining entire, that portion of the

secreting organ of the aqueous humour which is lodged in that cavity, continues its functions, and by its overbalancing supply of aqueous humour forces the united iris and pseudo-cornea to expand into a constantly more and more attenuated tumour; whereas when both chambers are obliterated, as they are in conical staphyloma, there can be no secretion of aqueous humour, so that when once a staphyloma of this kind has formed, it will maintain nearly the same size.

Another circumstance explained by this morbid anatomy of staphyloma, is the rarity of the conical variety, in comparison with the spherical. The cases in which inflammation extends its influence so deeply as to obliterate both chambers, must evidently occur less frequently than those in which merely the anterior is affected.

As to the size attained by spherical staphyloma, that depends much on the degree of activity possessed by the source of the aqueous humour, residing in the posterior chamber. The less this source has suffered from the preceding inflammation, the greater will be the quantity of aqueous humour secreted, and the greater consequently the expansion of the united iris and pseudo-cornea. Although at first extremely thick and very tough, so as to resist division with the knife, we not unfrequently see spherical staphyloma become in time so thin and transparent, from distention and interstitial absorption, that the patient is able to distinguish a number of objects around him, and is sometimes led to entertain hopes of a complete recovery of his sight from the operator. This appearance is always the forerunner of the bursting of the staphyloma, which is followed by a sinking away of the tumour for a day or two, but is soon succeeded by its re-appearance in its former shape, and with its former dimensions. This enlargement and thinning till it bursts, never happens to conical staphyloma. The apex of a conical staphyloma sometimes ulcerates, at which time we see large red vessels running from the sclerotica and conjunctiva to the ulcer. Great part of the staphyloma may be destroyed by the process of ulceration, which is attended by much pain, and renders the opposite eye weak.

Spherical staphyloma, altogether neglected, sometimes reaches a prodigious size, and involves the sclerotica and choroid, as well as the cornea and iris. The accumulated aqueous fluid behind the iris and cornea, presses back the lens and vitreous humour, and insinuates itself between the latter and the choroid. The whole eyeball is in this case greatly expanded, and the sclerotica being much attenuated, permits the choroid to shine through it, so that the eye assumes a deep blue colour.

There is a circumstance regarding spherical staphyloma, which merits attention, namely, that when the tumour attains a large size, the iris, unable to expand to the same degree as the pseudo-cornea, and its texture much more frail, separates from the choroid, and becomes torn into shreds, so that when we examine the internal surface of such a staphyloma, after death, or after it has been re-

Fig. 62.

moved by an operation, we find the iris which adheres to the pseudo-cornea, broken and reticulated (*Fig.* 62.); whereas the internal surface of a staphyloma which has not reached a great size exhibits the iris still entire.[7] (*Fig.* 63.) It sometimes happens, that a spherical staphyloma, increasing very slowly, while the shreds of iris on its internal surface undergo laceration and absorption, the pseudo-cornea clears in some slight degree, so that the perception of light and shade, and of luminous objects, as the fire or a candle, becomes more distinct.

Fig. 63.

Prevention. When we see an eye destroyed by total abscess and ulceration of the cornea, as we often do from ophthalmia neonatorum, we readily foretell the probability of the case ending in total staphyloma. The question has been agitated, Is there no method of preventing this termination? Now, it sometimes happens, that although the cornea is entirely destroyed in purulent or some other ophthalmia, staphyloma does not result, but the cicatrice which forms, in the place of the cornea, continues flat, and the eye becomes atrophic. Mr Jones conjectures that in such cases the lens has escaped through the ulcerated cornea; and proposes as a probable means of preventing staphyloma, the removal of the lens, before the process of cicatrization has commenced. For this purpose, it will sometimes be necessary to make an incision through the iris, as the pupil is generally closed in those cases where the cornea has been destroyed by suppuration. Mr Jones conceives that the supply of aqueous humour in the still existing posterior chamber keeps up the distention of the iris, on the surface of which the pseudo-cornea is moulded in the form of a round prominence. To break in upon the integrity of the posterior chamber, therefore, he extracts the lens, a proposal which he put in practice in the following case.

Case 239.—A man, about 22, came to Mr Jones labouring under the effects of severe purulent ophthalmia of both eyes. In the right eye, the cornea being destroyed, and the pupil closed, the iris protruded and was distended with aqueous humour. The left eye had also suffered very much; there was penetrating ulcer, prolapsus iridis, and consequently distortion and contraction of the pupil. Both eyes were still affected with the inflammation, and it was very doubtful whether the left eye could be prevented from getting worse, especially as it was evidently kept in a state of additional irritation from the presence of the staphyloma in the right. By an incision with a Beer's cataract-knife through the protruding and distended iris, the lens was extracted. Severe re-action followed; less perhaps in consequence of the operation, than from the patient not being in a situation to take proper care of himself. The iris did not again become distended; on the contrary, the eye shrunk, and irritation being thus removed, the left eye progressively improved, as far as the organic changes it had already undergone allowed, and farther than there had been reason to hope for, as sufficient vision was preserved to enable the patient to resume his employment as a porter.

Laying hold of the exposed iris with the forceps, and removing it from the eye, is another means, which would have the effect of preventing the formation of staphyloma. If this were done, the pseudo-cornea would be formed on the surface of the crystalline lens.

Prognosis. There is no possibility of restoring sight to the patient affected with total staphyloma, even in cases where there

can be no doubt that the lens, vitreous humour, and retina, are perfectly sound. All that we can do in the way of relief is to remove a tumour which is extremely unsightly, and frequently very painful. If a staphylomatous eye receive a blow, it is apt to burst, in consequence of which, blood and water are discharged; the wound heals, and sometimes the tumour shrinks, and never returns. Projecting beyond the eyelids, a staphyloma keeps up constant irritation, and renders the opposite eye unfit for exertion. Attacked by catarrhal inflammation, a staphylomatous eye is apt to become gangrenous, and the tumour to slough. It is, proper, therefore, to remove as soon as possible, every considerable total staphyloma. This affords the patient a great degree of relief, and enables him to use the opposite eye with freedom.

Treatment. Many proposals have been made for removing total staphylomata without operation. The application of the muriate of antimony has been particularly tried, in consequence of the recommendation of Richter. It was also supposed that by mere incision of the staphyloma, passing a thread through it, or excision of a small part of it, so that the eye was kept open, the cure of this disease could be accomplished.[8] All these have been found to fail. Incision is merely a palliative; the seton is tedious, and not to be depended on; escharotics are apt to excite the eye into a state terminating in exophthalmia. Beer, on the other hand, mentions that he had removed 216 staphylomata by operation, and that in not a single instance had any dangerous accident followed.[9]

Operation. The operation for total staphyloma consists, first in the formation of a flap with the knife, and secondly, in the removal of that flap with the scissors.

While the assistant keeps the upper eyelid raised, a pretty large hook is to be passed through the centre of the staphyloma, or it may be transfixed with a small curved needle, carrying a waxed linen thread. In the hand which does not hold the hook or ligature, the surgeon takes the staphyloma-knife, which is nothing more than the cataract knife somewhat enlarged. With the cutting edge directed upwards, the staphyloma is to be penetrated at its temporal edge, close to its basis, and at such a distance below its transverse diameter, that two-thirds of the tumour shall be included in the incision to be made with the knife. The point of the knife ought to be passed perpendicularly into the staphyloma. Having penetrated through the cornea and iris, the handle is to be carried backwards till the instrument is brought into a position parallel to the basis of the staphyloma. The knife is now to be carried onwards till it reaches the point of exit, which ought to be in a horizontal line with the point of entrance. The flap is completed by the progressive motion of the knife, till it fairly cuts itself out. The operation is instantly to be completed, by dividing with the curved scissors that part of the circumference of the staphyloma which remains in connexion with the sclerotica. At the same moment, the assistant lets fall the upper lid, which must not again be raised for eight days.

During the whole of the operation, and especially towards the end of it, care must be taken that the eyeball is not irregularly and forcibly pressed, as this might readily give rise to the escape of the lens and vitreous humour, which ought, if possible, to be preserved. In cases of conical staphyloma, it is scarcely possible to avoid the loss of the lens, or, if the lens is wanting, of part of the vitreous humour. This is owing partly to the adhesion which subsists between the capsule of the lens and the iris, so that the knife actually passes behind the lens and through the vitreous humour, and partly to the dissolved state of the hyaloid membrane, generally attendant on this kind of staphyloma.

If the sclerotica has taken a considerable share in the disease, and if there is a number of dark blue varicose protuberances round the staphylomatous cornea, rather than confine the operation to the removal of the cornea and iris merely, it is better to take away the anterior third of the eyeball; an operation which, though occasionally followed by shrinking of the remains of the eye to a very small size, in general leaves it sufficiently large to support an artificial eye.

After the operation for staphyloma, strips of court plaister are to be applied so as to keep the lids of both eyes from moving. They are then to be covered with a spread pledget, supported by a roller.

If the vitreous humour, and more especially if the lens, has been preserved, we generally find on examining the eye eight days after the operation, that a grayish semitransparent, and flat pseudo-cornea is already produced, through which the patient, were we to allow him, might be able to discern a number of objects. Gradually this membrane becomes opaque, till at last the place of the staphylomatous cornea presents a firm cicatrice, with bluish or brownish streaks. As to the form of the eyeball, it has, in some cases, lost only the projection of the cornea; while in other cases, it assumes a somewhat square shape, from the action of the recti. When it has completely recovered from the operation, an artificial eye may be worn, by which a high degree of illusion may be produced.

It occasionally happens, especially in cases of staphyloma attended with varicosity of the internal vessels of the eye, that either immediately, or some hours after the operation, hæmorrhagy takes place, both from the eye and into its cavity. A bloody, dark-coloured mass, of pretty considerable consistence, protrudes to such an extent from the wound, that it is impossible to keep the eyelids shut. The eyeball is painfully distended, while the conjunctiva and lids become greatly ecchymosed. The hæmorrhagy into the eye gives rise in some cases to agonizing pain, and may even bring on convulsions. Under such circumstances, we ought to cut away with the scissors the protruding substance, which perhaps is in some cases the hyaloid membrane injected with blood, but in other cases is nothing more than a clot of blood, hanging from the front of the eye. After this is done, the bleeding ceases, and the pain abates. Left to itself, the protrusion dies away in the course of a few days.

The eye is apt in either case to shrink below the usual size of a staphylomatous eye after operation.

It occasionally happens that the opening into the eye, formed by the removal of the staphylomatous cornea and iris, is long of closing, no pseudo-cornea being present when we open the lids on the eighth or tenth day, and even for weeks the clear humours lying uncovered behind the gap in the front of the eye. At length, however, the aperture contracts and cicatrizes. Fungous granulations sometimes sprout from the aperture, requiring the use of lunar caustic. If the eye is not kept shut after the operation, the lens may come forward and protrude through the wound. When this is the case, the lens should be removed, and the eye kept closed till the cicatrice is formed.

Violent inflammation sometimes supervenes to the operation for staphyloma, ending in suppuration both within the eyeball and in the surrounding cellular membrane. This must be combated by a strict antiphlogistic plan of treatment, opiates will be required to abate the severity of the pain, a poultice is to be laid over the eye, and any abscess which may form is to be immediately opened with the lancet.

§ 4. *Staphyloma of the Choroid and Sclerotica.*

This kind of staphyloma, a frequent consequence of choroiditis, is either partial or total. The appearance of the former is represented in figure 53, page 490, and that of the latter in figure 54, page 493. A partial choroid staphyloma, resulting from an injury, is represented in figure 43, page 339, and the annexed figure represents a general choroid staphyloma, which also originated in traumatic inflammation. The cornea, in neither of these last two cases, was involved in the staphylomatous degeneration, but the state of the eye where the cornea is involved, is well represented in figure 54, page 493. Such an eye has somewhat of a malignant air, so as to be mistaken sometimes for fungus hæmatodes.

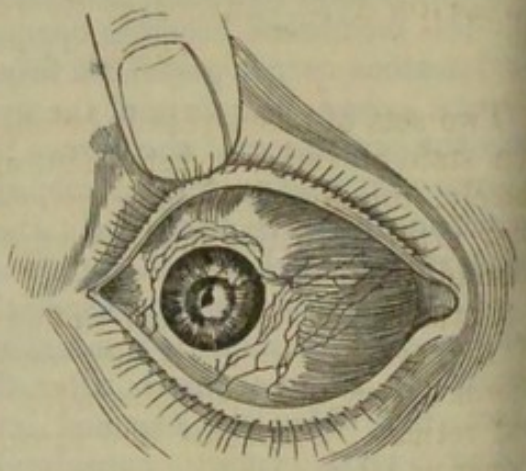

Fig. 64.

Puncturing the eye is a practice whence much advantage is derived in choroid staphyloma. (See page 496.) We sometimes meet with an unexpected occurrence in performing this operation. The large quantity of fluid vitreous humour, instead of flowing out of the eye, insinuates itself between the sclerotica and conjunctiva, so that the eye is apparently not reduced in size, but looks rather larger. The patient also feels more tension and pain than he did before. Gradually the fluid is removed by absorption, and sometimes the

pressure appears to have a good effect, the eye never filling again, but remaining of a small size.

When a partial choroid staphyloma near the front of the eye is very prominent and insulated, it may be removed like a staphyloma of the cornea and iris. By passing a thread through it, the fluid contents of the tumour drain off, and the staphyloma, now become flaccid, may be snipped off with the scissors.

In cases of general choroid staphyloma, involving the cornea and iris, I have extirpated the anterior third of the eyeball, with good effect, the eye shrinking to a size fit for the application of an artificial eye.

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[1] Σταφυλὴ, *a grape.*
[2] *Iridoncus,* or *iridoncosis,* from ἶρις, *iris,* and ὄγκος, *tumour.*
[3] Ammon's Zeitschrift für die Ophthalmologie; Vol. v. p. 262; Heidelberg, 1836.
[4] De Corneitide Scrofulosa; p. 9; Jenæ, 1830.
[5] From *racemus, a bunch of grapes or berries.*
[6] London Medical Gazette; vol. xxi. p. 847.
[7] Beer's Ansicht der staphylomatösen Metamorphosen des Auges; Plate 1. fig. 1 and 2; Wien, 1805.
[8] Celsus de Re Medica; Lib. vii. Pars ii. Cap. i. Sect. 2.
[9] Lehre von den Augenkrankheiten; Vol. ii. p. 216; Wien, 1817.

SECTION XV.—VARICOSITY OF THE EXTERNAL AND INTERNAL VESSELS OF THE EYE.

Two sets of blood-vessels belonging to the eye are apt to be left in a state of varicose distention, after certain of the ophthalmiæ; namely, the recto-muscular arteries or their accompanying veins, after arthritic iritis, and the vasa vorticosa of the choroid, after choroiditis.

Little can be done, and nothing directly, to remove this state of the vessels, which is not only in general beyond cure, but affords a very unfavourable index of the condition of the humours and retina. Glaucoma and amaurosis, in almost every case, are sooner or later added to varicose distention of the blood-vessels of the eye.

I was consulted by a lady, who complained of an uneasy feeling in one of her eyes, on the surface of which ran a single large varicose blood-vessel. The dyspeptic symptoms of the patient led me to prescribe the internal use of a mixture of columbo, rhubarb and carbonate of soda. The belladonna collyrium (page 427) was employed as an external application. By the use of these remedies, the symptoms were removed.

SECTION XVI.—AMAUROSIS.

Complete or incomplete insensibility to light is a frequent consequence of inflammation, especially when it has originated in the retina, or spread to it from the other internal textures of the eye, as, the choroid, or the iris. When the inflammation has been completely subdued, but the amaurosis continues, recovery of sight may be regarded as hopeless.

SECTION XVII.—OSSIFICATION IN DIFFERENT PARTS OF THE EYE.

Ossification, or calculous deposite, certainly occurs as an occasional sequela of long-continued ophthalmia; and, indeed, it may be suspected that in all instances, and in whatever texture of the body, an unnatural formation of osseous substance takes place, it is preceded by a certain kind or degree of inflammatory action. Those eyes, in which parts are found ossified, are generally atrophic, the cornea opaque and shrunk, or the iris and cornea staphylomatous.

§ 1. *Ossification of the Cornea.*

Voigtel[1] mentions, that in the Walterian Museum at Berlin, there was a piece of cornea preserved, which had been converted into bone. It was three lines long, two broad, and weighed two grains.

Chelius[2] states, that in leucomata of old standing it is not uncommon to find depositions of phosphate of lime.

In dissecting an eye, of which no history could be obtained, Mr Wardrop[3] found several gritty particles and inequalities on the internal surface of the cornea.

§ 2. *Osseous Deposite in the Anterior Chamber.*

Though Mr Wardrop gives the following case, communicated to him by Mr Anderson, surgeon at Inverary, as one of a piece of bone formed in, or immediately behind, the cornea, I cannot help suspecting it to have been merely a dislocated lens and capsule, which had become partially ossified in the anterior chamber, an event which is not uncommon.

Case 240.—On examining the right eye of a woman of 31 years of age, Mr Anderson observed a substance of a whitish appearance, arising from the inside of the sclerotic coat, and extending upwards behind the cornea, over a great part of the iris to very near the pupil. It had produced much irritation in the eye, with inflammation, severe pain, an almost constant flow of tears, inability to bear the light, and a considerable diminution of vision. The eye was less in size than the other. The complaint was the consequence of a fall, 15 years before, at the root of a tree, by which the patient struck the eye, but did not cut any part of it. From this period, the substance seen through the cornea had begun to grow, and had gradually increased in size. The pain and other symptoms had been sufferable until about nine months before Mr Anderson saw her, when the complaint became more violent. He made an incision into the cornea, in the manner recommended for the extraction of the cataract, raised the flap of the cornea with a flat crooked probe, and with the same instrument turned out a small piece of

bone. The upper part of it was as thin as a piece of paper; at the under part it was thicker, porous, and brittle, and of an irregular semilunar form. The upper part was quite detached, the under part slightly adhered to some part of the globe out of sight; but it was easily extracted, without requiring the knife to separate its adhesions. From the unsteadiness of the patient, it was impossible to discover from what part the ossification originated.[4]

Mr Wardrop mentions, that a case similar to Mr Anderson's had come under his own observation, thin laminæ of bone having been discharged at several times from the anterior chamber, through ulcers formed in the cornea; and that he also had had an opportunity of examining a case under Mr Wishart's care, where that portion of the capsule of the aqueous humour which is reflected over the iris, was almost entirely converted into a bony shell.[5]

§ 3. *Ossification of the Choroid Coat.*

Voigtel has described various preparations belonging to the Walerian Museum, in which the choroid coat was more or less completely ossified. In one the posterior half was so affected; in others, the anterior part; in some, the whole choroid. He also quotes from Günz, an instance of ossification between the lamellæ of the choroid coat.[6]

Mr Wardrop, under the head of ossification of the choroid, mentions that he had met with a few instances of a thin cup of bone between the sclerotic coat and the retina; that the retina was in immediate contact with the interior surface of the bone, but that between the sclerotic coat and the ossification there was a very thin, tender, and pale-coloured membranous expansion, the only vestige of the choroid; and that at the bottom of the cup, there was a small round perforation, through which the retina passed to expand on the interior surface of the osseous shell.[7] It may be doubted whether such cases were not rather ossifications of the membrane of the pigment, or of the membrana Jacobiana, than of the choroid.

In a preparation of coarcted retina, now before me, and which I owe to the kindness of Mr Norris, late of the Glasgow Royal Infirmary, the choroid is partially ossified. The eye was atrophic, and the cornea opaque.

§ 4. *Ossification of the Retina.*

Morgagni, Morand, and others,[8] have recorded instances of cup-like ossifications within the choroid. Ossifications in this situation have generally been regarded as situated in the retina. The proper retina, however, by which I understand the medullary and vasculo-cellular layers of that membrane, is rarely, if ever, affected in this way, but is generally found entire within the ossified cup. (See *Fig.* 65.) Whether the calcareous matter is deposited in a false membrane, in the membrane of Jacob, or in that of the pigment, remains doubtful. In a recent eye, when the membrane of Jacob is removed, a mucus-like layer may be peeled off the surface of the retina. Perhaps this may sometimes be the seat of the osseous deposite. Panizza's opinion is that fluids, extravasated between the

membranes of the eye, in consequence of inflammation, are capable of depositing calcareous crusts.

Morgagni says, that in the case which fell under his observation, instead of the retina, there was a thin bony lamella under the choroid universally.[9]

In Morand's case, both surfaces of the proper retina appear to have been enveloped by the osseous substance, so that, unless we adopt Panizza's opinion, we must conclude that it was the membrana Jacobiana, or external layer, which was ossified, along with the hyaloid membrane. The patient had been blind of the eye thus affected for 20 years; when about 15, he had a violent inflammation of that eye, followed by the formation of a yellow cataract, which several oculists had offered to remove by operation, but the patient would never consent.[10]

Cloquet's case, one of the most accurately described, is as follows:—

Case 241.—The eye was taken from the dead body of a man aged about 50. The cornea and iris were staphylomatous; the eye more voluminous than natural, and longer in its transverse diameter than in any other. On being pressed between the fingers, it resisted sufficiently to show that its membranes were sustained interiorly by some solid body. The sclerotica presented nothing particular; nor did the optic nerve, which retained its natural size and organization. The choroid had the ordinary appearance; with its vessels injected. The ciliary ligament had almost entirely disappeared. The iris, in a deformed state, adhered to the posterior surface of the cornea, as did the crystalline lens, which was atrophic and of an irregular form. The aqueous humour had disappeared; the vitreous was very limpid and fluid. The internal surface of the choroid adhered slightly to a very thin osseous shell, formed by the deposition of calcareous granulations into the substance of what Cloquet conceives to have been a false membrane, existing between the choroid and retina. (*Fig.* 65.) The shell had no adhesion to the retina. It had a round opening for giving passage to the optic nerve. Posteriorly it was pretty thick, but anteriorly very thin, and ended with an irregular fringed edge. It presented on different parts of its extent, small irregular openings, closed by a fine transparent membrane, in the substance of which were observed many white delicate granulations, not yet united into osseous laminæ. The retina examined under water, presented no visible alteration in its organization.[11]

Fig. 65.

Case 242.—Professor Panizza examined the eye of a man, of 60 years of age, who had lost the sight of it in his youth, from internal ophthalmia. The cornea was completely opaque, and flattened. The sclerotica was natural in form, but somewhat less in size, and hard to the touch. The sclerotica being divided circularly, and the choroid raised, a white, hard, stony substance, somewhat rough came into view. After the eye had been left in alcohol for two days, the dissection was continued. On reversing the anterior segment of the sclerotica and choroid, the calcareous substance was found to be present under the whole of the latter membrane. The iris adhered firmly to the internal surface of the cornea, and to the lens, which was shrunk and ossified. The posterior segment of the sclerotica and choroid was easily reversed, there being almost no connexions between the parts, except by means of some vessels, which passed into the calcareous substance lying beneath. These attachments being separated, Panizza noticed that the whole calcareous mass hung from the optic nerve, which penetrated by an opening into its interior. Desirous of ascertaining the state of the retina, he

cautiously removed a portion of the calcareous substance. He found the calcareous shell very resisting on its external surface, although brittle, about a line in thickness, and formed of strata, of which the innermost were the least hard, and at last almost membranous. Having thus penetrated to the cavity of the shell, he found it filled with a whitish substance, albuminous, of the consistence of jelly, and arranged in strata, which became softer and softer towards the centre of the eye, and which he compares to the layers contained in an aneurismal sac. He removed a part of this substance, and saw in the middle of it the retina, in the form of a membrane which had been gathered together. Passing from behind forwards, it terminated anteriorly by attaching itself, in an expanded state, to the posterior margin of the corpus ciliare, while its slender posterior extremity corresponded to the entrance of the optic nerve through the sclerotica. On making a vertical section of the conical portion of the retina, Panizza found within it the hyaloid membrane, corrugated, and reduced to a very small mass, along with a little of the vitreous humour. Raising the flaps of the divided retina, he found its internal surface smooth, and not at all adherent to the hyaloid.[12]

Reasoning from this dissection, Professor Panizza rejects the notions of those who have attributed such states of the eye to ossification of the hyaloid or of the retina, and adopts the opinion, already noticed, that such calcareous incrustations arise from the condensation of extravasated fluids.

§ 5. *Ossification of the Hyaloid Membrane, Crystalline Capsule, and Crystalline Lens.*

Many examples have been recorded of ossification of the crystalline lens and capsule; and in some of these, the hyaloid membrane has been more or less affected in the same manner.

"In one case," says Mr Wardrop, "besides the capsule of the lens being ossified, I found several large, but thin scales of bony matter, dispersed in an irregular manner throughout the vitreous humour, which, in all probability, were ossifications of the hyaloid membrane."[13]

Ossification of the capsule appears to be much more frequent than that of the substance of the lens. In one case of capsular cataract, I found the anterior hemisphere of the capsule hard and gritty under the needle. The disease had originated in iritis, followed by contracted pupil and lymphatic exudation. The cataract was depressed, and a tolerable share of vision was restored.

The anterior hemisphere of the capsule is more frequently ossified than the posterior. In some cases, the whole capsule is converted into a thin shell of bone, containing the lens in an opaque state. In other cases, the lens has been previously absorbed, in part or completely, so that the ossified capsule has a less regular form, having become shrivelled before being converted into bone.

In an eye sent to Mr Wardrop by Mr Allan Burns, the central portion of the lens was found converted into a hard bone. This was the only instance which Mr W. had met with, in which ossification of the lens was unattended by ossification of the capsule. The ossified centre of the lens was of a deep brown colour, and exhibited a laminated structure.[14]

Pellier[15] relates an interesting case, in which the cornea of an eye, which, for twenty years, had suffered more or less from inflam-

mation, at length gave way, and allowed an ossified lens to be seen and felt. A crucial incision was made through the cornea, and a portion of calculous substance of the size of a kidney-bean was extracted. Part of the ossification was still left in the eye, the patient having become so restless that it could not be removed. Pellier seems to think that the whole contents of the eye were in an ossified state. The piece extracted was rough and irregular.

The lens, dislocated into the anterior chamber in consequence of a blow on the eye, is, as I have already mentioned, very apt to become ossified.

A careful perusal of the cases recorded of ossification in different parts of the eye, will confirm, in a very striking manner, the remark with which I commenced this section, namely, that this morbid change has generally been the consequence of long-continued inflammation.

As for the diagnostic signs of this state of the eye, they must be obscure, for the pupil is generally contracted or closed in such cases, and the eye atrophic.

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[1] Handbuch der Pathologischen Anatomie; Vol. ii. p. 92; Halle, 1804.
[2] Ueber die durchsichtige Hornhaut des Auges, p. 56; Karlsruhe, 1818.
[3] Morbid Anatomy of the Human Eye; Vol. i. p. 74; London, 1819.
[4] Ibidem, p. 75.
[5] Ibidem, Vol. ii. p. 18; London, 1818.
[6] Op. Cit. Vol. ii. p. 97; Halle, 1804.
[7] Op. Cit. Vol. ii. pp. 68 and 272; London, 1818.
[8] Haller, Opera Minora; Vol. iii. p. 366; Lausannæ, 1768.
[9] De Sedibus et Causis Morborum; Epist. lii. Art. 30.
[10] Mémoires de l'Académie Royale des Sciences, pour 1730; p. 467; Amsterdam, 1733.
[11] Pathologie Chirurgicale, par Jules Cloquet, p. 130; Pl. x. fig. 1 and 2; Paris, 1831.
[12] Panizza, Appendice sul Fungo Midollare dell' Occhio; p. 22; Pavia, 1826.
[13] Op. Cit. Vol. ii. pp. 128 and 271; Pl. xiv. fig. 2; London, 1818.
[14] Ibidem, pp. 96 and 261; Pl. xi. fig. 5.
[15] Recueil de Mémoires et d'Observations; Obs. 139; Montpellier, 1783.

CHAPTER XIV.

ADAPTATION OF AN ARTIFICIAL EYE.

It would appear,[1] that in former times, when the eye and eyelids had been destroyed, or removed in consequence of disease, a painted imitation of these parts was sometimes applied over the front of the

orbit, and kept in its place by means of a steel-spring going round the temple to the opposite side of the head; but, at the present day, by an artificial eye is generally meant a hollow plate of enamel, made to resemble the front of the natural eye, and introduced behind the eyelids. Enamelled plates of gold have sometimes been used for this purpose, but in general artificial eyes are made altogether of enamel and glass.

An artificial eye ought to be perfectly smooth, and of such a form and size as to cover the remainder of the natural eye without pressing much on it, or irritating it in any way. Its edge ought not to be sharp, but rather thick and round. The internal surface of the middle portion, which represents the cornea, ought to be concave, or at least flat, and not, as we sometimes find it, convex, which form must necessarily give rise to pressure on the eye, unless it be much shrunk. Want of attention to these particulars is often the cause of the pain which patients feel from the introduction of an artificial eye, and which often leads them to resign all thoughts of continuing its use.

Thinness and lightness are indispensable requisites of an artificial eye. When the remains of the natural eye are large, unless the artifical eye is thin, the lids are too much pressed out, and are prevented from executing their usual movements.

If the remains of the eye are irregular in form, the artificial eye must be made so too, lest it press unequally and injuriously against any part. When the upper eyelid, for example, is partially adherent to the remains of the eyeball, the diameter of the artificial eye from above downwards must be shorter than common, or it must have a notch in its edge opposite to the point of adhesion.

The particular hue of the white of the eye, the appearance of the vessels strewed over it, and the size and colour of the iris, ought to be exactly imitated from the sound eye. The pupil ought to be represented at its medium degree of expansion, and the appearance of an anterior chamber ought to be given. I have observed, however, that the iris looks darker, when the eye is introduced behind the eyelids, than it does when examined in the hand.

The manufacture of artificial eyes, is very simple, but it is probable that different artists adopt different methods of making them. The reader will find Blancourt's directions on the subject in the note below.[2] The part imitating the sclerotica is formed of white enamel, with a tinge of yellow. The posterior lamina of the central piece is coloured and streaked to look like the iris; on the middle of this lamina a circular patch of black enamel is laid, to imitate the pupil; the superficial lamina is transparent glass. Threads of red enamel are spread over the surface in imitation of blood-vessels, and are melted in before the blow-pipe.

If the defective eye, which the patient is desirous of covering from view, is not larger than the natural size, an artificial eye may be worn without any previous surgical operation, but if there is a staphyloma present, this must first be removed. The effects of any

injury which has rendered the application of an artificial eye desirable, or of any operation which has been performed on the eye, must first be completely cured, and an additional space of some months must have elapsed before the artificial eye can with propriety be tried. In some cases, indeed, from the great irritability of the patient, causing a tenderness and epiphora which cannot be subdued, or from the nature of the disease in which the loss of the eye took place, giving ground to dread lest irritation might bring on perhaps some malignant disease within the orbit, we are obliged to resign all thoughts of applying an artificial eye.

If there is no inflammation, no fungous excrescence from the eyeball or eyelids, no pain or irritation present, an artificial eye may be tried. The mode of introducing it, is to lay hold of it by its lower edge with the thumb and forefinger of the right hand, moisten it, with the left thumb raise the upper eyelid, under which introduce the upper edge of the artificial eye, pressing it up into the upper fold of the conjunctiva, till its most prominent part is hid; then to allow the upper lid to descend. The artificial eye is now to be supported with the right thumb, while with the left forefinger, the lower eyelid is to be forcibly drawn downwards, which allows the artificial eye to slide behind it into the lower fold of the conjunctiva. If the edge of the artificial eye does not reach the fold, but rests on the tarsus, it is too large, and a smaller one must be selected.

For some days, the eye is to be worn only during a few hours. It is withdrawn with the aid of a gold or silver probe, of the thickness of a knitting needle, the end of which is rounded off and bent into the form of a hook. With the forefinger of the left hand, the lower lid is to be depressed, so as to allow the hook to be introduced behind the edge of the eye, which by this means is to be raised till it is no longer grapsed by the lower lid; the eye immediately glides from the upper fold of the conjunctiva, and is to be laid hold of by the left hand. The eye is to be immediately washed in clean cold water to free it from the mucus which adheres to it, and laid aside till next day.

The patient is soon able to introduce and withdraw the eye without assistance. While withdrawing it, he leans over a bed, in order that, if it should fall, it may not be broken.

If the eyeball has shrunk to a very small size, or if it be removed, the eyelids lose that support and elasticity necessary for the performance of their motions; the consequence is, that they soon become entirely motionless, and sink into the orbit, while the folds of the conjunctiva, which in the natural state of the parts extend over the anterior part of the eyeball, gradually become contracted, and at last almost abolished. The superabundant tears and mucus cannot be properly excreted, being no longer pressed forward by the convexity of the eyeball, but gather behind the lids and adhere to their edges and angles, while the nostril of the same side feels dry. These symptoms are in general greatly lessened by the use of an

artificial eye, which affords to the lids a new support, restores to them the elasticity necessary for their motions, and expands again the folds of the conjunctiva; while the renewed action of the lids serves to convey the tears and mucus to the puncta lacrymalia, as in the state of health. In such cases, we must commence with a very small artificial eye, and employ larger ones, proportionally as the folds of the conjunctiva will admit. We need not be afraid that a very small eye will in such circumstances fall out from between the lids, for we may observe that the lids are enabled to open only in proportion to the size of the eye which is placed behind them.

We may begin with the use of a small plain eye; by which I mean one without any representation of the iris. A series of such eyes ought to be kept by the oculist, and employed till the patient becomes accustomed to their use. The lids cannot in general be easily moved at first over an artificial eye, so that it remains exposed to the foreign matters driven through the air, and both from this cause, and from the first attempts of the patient to remove and replace it, is apt to become scratched, which very soon destroys its appearance. Every two or three days, a larger eye ought to be introduced, till at length the lids shall appear to have reached nearly their natural degree of expansion.

The iris and pupil of the eye which is to be used permanently must correspond in direction with those of the sound eye, and must not be placed nearer to either canthus, else the patient will appear to squint with the artificial eye. Some artificial eyes are made for the right or left side only, and have more sclerotica above than below the iris, others are intended to be used on either side, and have the iris placed midway between the upper and lower edges of the eye. In all artificial eyes there is more sclerotica on the temporal than on the nasal side of the iris.

A properly adapted artificial eye performs the same motions as the sound eye, especially if the remains of the eyeball over which it is placed are considerable, and are moved with facility by the recti. The motion of the artificial eye, however, does not depend upon this alone, but also on the motion of the conjunctiva and its folds, into which the artificial eye is received, and which possess a simultaneous movement with the eyeball and eyelids. Hence it is that if the artificial eye is of a proper size, neither so small as to escape the influence of the conjunctiva, nor so large as to prevent that influence, we find that it performs all the ordinary motions of the eye, even when the stump which is covered is very small.

An artificial eye soon begins to suffer from the friction of the eyelids, and the influence of the tears and mucus, so that the cornea becomes dim from the glass losing its polish. It has been supposed that it is the Meibomian secretion which is chiefly detrimental. The polish is never completely preserved for longer than three or four months; and generally in six months the whole surface of the eye is rough and hazy. The red threads, imitating blood-vessels, sometimes dissolve entirely, leaving slight grooves, before the cornea or

sclerotica becomes dim or rough. The rapidity with which this process goes on, varies in different individuals, depending on the peculiar qualities of the secretions. This circumstance, along with the extravagance of the price, puts it completely out of the power of any but those in easy circumstances to use artificial eyes. Others must submit to conceal the defective eye behind a dark coloured glass, or if its appearance is very unsightly, to hide it with a shade. They ought never to adopt the practice of covering it closely up with a piece of black plaister, which heats the eye too much, and renders the parts inflamed and œdematous.

Enamel eyes which have lost their polish, prove hurtful, their roughness exciting the conjunctiva to inflammation, excoriation, and the growth of fungous excrescences. When an artificial eye, therefore, is observed to have become dim, and to be producing irritation, it must no longer be used, any irritation already present must be calmed, and when the parts are again perfectly free from pain or inflammation, a new artificial eye, or the old one re-polished, may be applied. It will sometimes be necessary to begin with a small one, as at the first.

When we wish an artificial eye made expressly for any particular person, it is necessary to send to the enameller a front view of the sound eye, representing accurately the colour and other appearances of the iris, along with a model in wood or lead of the size and form of the artificial eye which is to be made, taking the convexity of this model from the sound eye, and marking on it the place and size of the iris and pupil. The drawing and models ought to be kept by the enameller, so that at any future time the patient can have an eye made after them, and sent to him, without further trouble.

In the use of an artificial eye, the strictest regard to cleanliness must be observed. Every 12 hours the eye must be taken out and freed from the mucus which adheres to it, and accumulates in its cavity. The eyelids and orbit must at the same time be bathed with tepid milk and water, and should there be any considerable relaxation of parts, or tendency to puro-mucous inflammation, a slightly astringent collyrium is to be employed, and the edges of the lids smeared with a little red precipitate salve. Should the conjunctiva appear swoln or fungous, it is proper to touch it with a lunar caustic solution. Sometimes it is necessary to snip away hard fungous folds of the conjunctiva. This must be done cautiously, lest the sinuses be rendered too contracted to hold the artificial eye, or adhesions form between the eyelids and the eyeball.

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[1] Œuvres d'Ambroise Paré; Liv. xxiii. Chap. 1.

[2] 'You must have a lighted lamp, and a long hollow piece of crystal, as thick 'as the middle of a pipe's shank; the bore must be pretty wide, and the pipe about '4 inches in length; let the mouth-end be like that of a trumpet, and the other 'widened and turned outwards like the breech; this may be done by heating one 'end in the flame of your lamp, and whilst it is hot, turn it so with a pair of 'nippers.

'Hold this pipe in your left hand, (having before put a little cotton into it,

'about an inch or less from the mouth, to hinder your breath from being too vio-
'lently blown on the work;) let it be between your two forefingers and thumb,
'as you would make a pen; heat the wide end in the flame red hot, and so wind
'long thread white enamel about the grossness of a bugle; your threads must be
'red hot too, and solid, then they will easily join the crystal pipe; make by this
'serpentine winding a convex of such diameter, as when blown out will answer
'that of the eye you would imitate.

'This done, keep the work in the flame till red hot, and so blow it out into an
'orbicular form, of a just largeness; then heating anew the top, pinch with your
'nippers a small hole, and so turn it with the end of them round, of the big-
'ness your eye must be within the white. In this hole wind pure thread-crystal
'as small as fine packthread, till you fill it up, taking away the superfluity (if any)
'with your nippers; heat it in the flame, blowing gently often; by this the crystal
'will work convexly, to give you the full shape of your eye.

'Upon this crystal (heating it again) you must wind crystal thread small almost
'as horse-hair, and coloured as the eye you would imitate; cover it once over, and
'as soon as the centre fills, cut off the thread with your nippers, that no surplus
'remain. You must hold it often in the flame, still gently blowing to keep it in a
'true order.

'Afterward with a piece of black enamel, about the thickness of a duck-quill,
'lay on the black of the eye; be very careful not to give any of these threads or
'pieces of enamel, too great a heat, nor apply too much of this black, for it will spread;
'therefore you must proportion your heats and quantities very exactly, still con-
'tinuing the work in the flame, and gently blowing as often as you would restore
'it to its shape: after this, cover the crystalline part of the eye with some crystal
'of a solid piece, about the thickness of a goose-quill, and so heating and blowing
'as before, bring it to its due form.

'Then hold the side thereof in the flame, and with a thread of white enamel,
'not quite so hot, you may as it were cut out the shape of your eye, as you would
'have it, oblique or otherwise; then border it with the said thread, holding the
'edges in the flame, to become smooth and even.

'Now if you find too much enamel in any part of the border, you may take it
'off with another thread of the same enamel, not altogether heated so much as that
'you would diminish, which must be held in the flame accordingly. Then pro-
'ceed to cutting and filing; and last of all, anneal it in a small pan of coals, and
'you have finished.' Blancourt's Art of Glass; Translated into English; p. 353;
London, 1699.

CHAPTER XV.

PARTIAL AND GENERAL ENLARGEMENTS OF THE EYE-BALL; EFFUSIONS AND TUMOURS WITHIN ITS COATS.

SECTION I.—CONICAL CORNEA.[1]

In some individuals, the cornea, instead of its natural shape, presents the form of a cone, more or less acute. Viewed from one side, the cornea in this state looks like a solid piece of glass, projecting from the front of the eye. The cone, in some cases, is pointed; in others, although it projects more, its apex is rounded

off. (*Fig.* 66.) The apex of the cone is generally in the centre of the cornea, but sometimes to one side of the centre. In some cases, the whole cornea partakes of the conical form; in other instances, the cone is small in comparison to the whole extent of the cornea, and rises rather abruptly. In certain positions of the eye, the point of the cone appears less transparent than the rest of the cornea, and not unfrequently it is actually nebulous or opaque. On placing the patient directly opposite to a window, the centre of the cone reflects the light with such force, as to produce a sparkling effect.

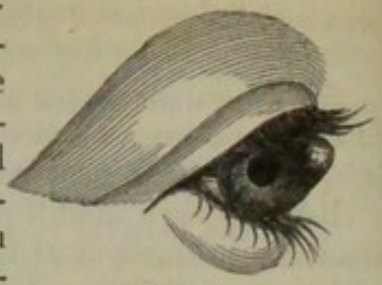

Fig. 66.

In the early periods of the disease, short-sightedness is the principal effect which it produces on vision; when more advanced, nothing is seen by the patient through the centre of the cornea; all the sight which he enjoys is either over the nose, or towards the temple, and in its sphere is extremely limited. Still, however, by strongly compressing the eye with the half-closed lids, and bringing the object close towards one or other side of the eye, generally towards the temporal, the patient is sometimes able even to read. Beyond two or three inches, vision becomes very indistinct, and at a few feet the patient, in general, sees absolutely nothing; he can judge neither of the distance nor form of objects, so that he is rendered nearly as dependent as if he were totally blind.

In its natural state, the cornea has no surface large enough to bend more than a single ray of light, and it aids in concentrating all the single rays into one place, there to form a vivid image of external objects; but in the disease now under our consideration, it presents inequalities, each of which, like a facette of a multiplying glass, bends a set of rays, capable of forming a separate image. Hence it is generally the case, that objects appear multiplied to an eye affected with conical cornea, so that the patient will mistake one finger for two, or two for three.

Case 243.—One of Mr Wardrop's patients observed, that when she looked at a luminous body at a distance, such as a candle, it was multiplied five or six times, and that all the images were more or less indistinct. When Sir David Brewster examined her eye, he observed, that in every aspect in which the cornea could be viewed, its section appeared to be a regular curve, increasing in curvature towards the vertex; a form, he remarks, which could produce no derangement in the refraction of the incident rays. As the disease was evidently seated in the cornea, which projected to an unnatural degree, it did not seem probable that there was any defect in the structure of the crystalline lens. He was, therefore, led to believe, that the broken and indistinct images, which appeared to encircle luminous objects, arose from some eminences on the cornea, which could not be detected by a lateral view of the eye, but might be rendered visible by the changes which they induced upon the image of a luminous object that was made to traverse the surface of the cornea. He, therefore, held a candle at the distance of 15 inches from the cornea, and, keeping his eye in the direction of the reflected rays, observed the variations in the size and form of the image of the candle. The reflected image regularly decreased in size when it passed over the most convex parts of the cornea; but when it came to the part nearest the nose, it alternately expanded and contracted, and suffered such derangements as to indicate the

presence of a number of spherical eminences and depressions, which sufficiently accounted for the broken and multiplied images of luminous objects.[2]

Sir David Brewster afterwards examined a great variety of cases of conical cornea: and in all of them, without exception, he detected inequalities in the superficial conformation of the cornea.

It was long a doubtful point, whether the cornea was merely protruded into the conical form which it assumes, or actually thickened, and the cone solid. The external appearance might certainly lead us to think that the latter was the case; and accordingly Sir William Adams has described[3] this disease as a morbid thickening and growth of the substance of the cornea. Mr Wardrop, however, states that the irregular portion at the apex of the cone, which is sometimes clouded and opaque, is generally very thin; and that in one case, a gentleman with this disease receiving a blow on the eye, the cornea burst. This view of the matter has been confirmed by Dr Jäger, of Erlangen, who, on dissecting the eyes of a person affected with conical cornea, found the apex of the cone very thin, but the circumferential portion of the cornea thickened.[4]

This disease generally begins first in one eye, and after a time attacks the other also. It has been met with in almost every stage of life; like common myopia, it appears most frequently about the time of puberty, or at least advances rapidly about that period, so that the patient is perhaps obliged, on account of extreme shortness of sight, to give up the trade he had already learned. In one instance, Mr Wardrop met with it in a boy of eight years of age. Sir W. Adams had seen it in patients from 16 to 70; much more frequently, however, in women than in men, and in young than in old persons. Dr Ammon states[5] that conical cornea is sometimes congenital. He once met with it in several sisters, who laboured under it from birth.

The progress of conical cornea is in general unattended by inflammation, pain, or feeling of distention. I have known it, however, to be preceded by headach and pain in the eye, for a considerable time. It is often the case, that the first symptom complained of, is dimness of sight, and unless the eye is carefully examined, amaurosis may be supposed to be present. I have seen conical cornea associated with scrofulo-catarrhal ophthalmia, and with common specks of the cornea.

It is not likely that this disease depends on any pressure by the aqueous humour. More probably it is an effect of some faulty action of the nutrient vessels of the cornea. I have a suspicion that it sometimes arises from the thinning of the cornea attending a transparent cicatrice or dimple. In a young lady, for whom I was consulted, it followed haziness of the cornea, and one or two small depressions, such as are left after the absorption of phlyctenulæ.

Treatment. I have never known conical cornea lessened by any remedy, internal or external. The treatment should have for object to prevent, if possible, the progress of the disease, and ward it off from the other eye, if only one is affected. This will be best ac-

complished by avoiding over-use of the sight, by exercise in the open air, attention to the bowels, and tonics, such as quina.

It is generally agreed that evacuation of the aqueous humour is of no use. Pressure, astringents, and all other local means, appear also to have failed in arresting the progress of conical cornea.

Mr Travers says he has found repeated blisters, and the more powerful tonics, as steel or arsenic, decidedly serviceable.[6] As it is evident, however, that he confounds conical cornea with aqueous dropsy,[7] it is impossible to know whether the benefit accruing from these remedies occurred in the former, the latter, or both of these diseases.

The patient sees better when his eyelids are all but shut, and the confusedness of vision is greatly lessened by the patient's looking through an opening of the size of the pupil, formed in a piece of black wood. This affords more aid in correcting vision than any form of lens. Indeed, notwithstanding Sir David Brewster's opinion, that the injurious effects of this disease upon vision may, within certain limits, be removed by glasses, and by preventing the image from being formed by rays passing through any part of the corrugated surface of the cornea, such as he discovered in Mr Wardrop's case, I have never learned that any patient has derived the slightest benefit from concave or other glasses.

Sir John W. F. Herschel suggests, as worthy of consideration, in very bad cases of irregular cornea, whether at least a temporary distinct vision could not be procured, by applying in contact with the surface of the eye, some transparent animal jelly contained in a spherical capsule of glass; or whether an actual mould of the cornea might not be taken and impressed on some transparent medium. "The operation," says he, "would, of course, be delicate, but certainly less so than that of cutting open a living eye, and taking out its contents."[8]

Sir W. Adams, from the opinion which he had adopted, that the conical form assumed in this disease was the effect of a morbid growth of the cornea, and that the short sight of the patient was to be attributed to the increased refractive power of the part, which, together with that of the crystalline lens, brought the rays of light to a point far short of the retina, suggested, that as it was impossible to remove the morbid state of the cornea, without rendering it unfit for the transmission of light, a useful degree of vision might be restored by removal of the crystalline lens. His opinion in favour of this plan was confirmed by what happened in the case of a woman of nearly 70 years of age, who placed herself under his care, labouring under this disease accompanied with cataracts. These he successfully removed, and had the gratification to find that the patient was capable of seeing much more distinctly without convex glasses than it is usual for those to do who have undergone the operation for cataract.

The favourable result of this case determined him, at the earliest opportunity, to try the effect of removing the crystalline lens, as a

remedy for blindness produced by conical cornea. A favourable case presented itself the following year:—

Case 244.—A young woman, who, during six years had found her sight gradually decreasing, at the expiration of that period became so blind, as to be unable to continue her employment as a servant. The cornea of each eye had assumed the conical form in a great degree, attended by a slight opacity in the apex of each cone, but none whatever in the crystalline lens. She could walk without a guide, and could see at the distance of three or four feet, so as to avoid running against any person, but had entirely lost the power of reading or perceiving minute objects, however near to the eyes. Sir William effected the removal of the crystalline lens of one of her eyes, by the operation of division. The patient, however, returned to the country before the eye had entirely recovered from the operation, and Sir William did not again see her until nearly 12 months afterwards, when he was in the highest degree gratified to find her capable of discovering minute objects, and reading the smallest sized print, without the assistance of a glass, while holding the book at the usual distance of 10 or 12 inches from the eye. The usual cataract spectacles for near objects, of two inches and a half focus, confused her sight nearly in the same manner as it had been before the crystalline lens was removed, while with those of 9 or 10 inches focus, her capability of seeing minute objects was somewhat improved. Objects at a distance she saw better without than with any glass which could be found.

I am ignorant whether the plan of obviating the effects of conical cornea, by removal of the crystalline lens, has been tried by any other oculist.

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[1] *Ochlodes* of Taylor. *Hyperkeratosis. Staphyloma pellucidum.*

[2] Wardrop's Morbid Anatomy of the Human Eye; Vol. i. p. 131; London, 1819.

[3] Journal of Science and the Arts; Vol. ii. p. 403; London, 1817.

[4] Carl Schmidt's Inaugural-Abhandlung über die Hyperkeratosis; p. 17. Erlangen, 1830.

[5] Zeitschrift für die Ophthalmologie; Vol. i. p. 123; Dresden, 1830.

[6] Synopsis of the Diseases of the Eye, p. 286; London, 1820.

[7] Ibidem, p. 124.

[8] Article *Light*, in Encyclopædia Metropolitana, p. 398; § 359. See farther on this subject, in a subsequent chapter, under the head of *Irregular Refraction*.

SECTION II.—HYDROPHTHALMIA, OR DROPSY OF THE EYE.

Dropsical affections of the eyeball, are sometimes connected with a cachectic state of the system, as the scrofulous, or that which attends chlorosis. They do not appear in any case either to form part of a general dropsy, or to be combined, in point of origin, with any other local dropsical affection. In general, they depend entirely on some local cause, which has operated, not so much in directly increasing the fluid contents, as in weakening the resisting power of the tunics of the eyeball, and especially of the cornea and sclerotica.

§ 1. *Dropsy of the Aqueous Chambers.*

Aqueous dropsy, the most common variety of hydrophthalmia, is a frequent consequence of corneitis. When it arises from this cause,

or from aquo-capsulitis, or when it follows an injury of the eye, or of the surrounding parts, it does not go to a great extent; but when it is congenital or constitutional in its origin, it sometimes proceeds till the anterior chamber is greatly dilated.

Symptoms. 1. At first, the cornea is merely more prominent than natural. In many cases, (for instance, when it arises from corneitis,) the disease never goes beyond this. But in other instances, the cornea evidently increases in diameter; and at the same time becomes thin. The increase in breadth may go on till the cornea is twice its natural diameter. I had a patient under my care, who could read, with a cornea still more enlarged than this. In advanced cases, it always appears a little cloudy, and sometimes becomes opaque.

2. The iris loses its power of motion, even from the commencement of the disease, and appears darker than natural. The pupil is generally in the middle state between contraction and dilatation; sometimes it is much dilated. In some cases, its edge is turned back towards the lens, so that the iris presents the form of a funnel. When aqueous dropsy is the consequence of a blow on the eye or on the edge of the orbit, the iris is often tremulous, and the retina insensible.

3. The patient complains of pressure and distention in the eye; scarcely ever of pain.

4. In the commencement, the eye is short-sighted, but this changes into an amaurotic weakness of sight, seldom reaching to complete blindness, except in traumatic cases. Muscæ volitantes are sometimes suddenly complained of, slowly followed by amaurosis. Objects sometimes appear multiplied to the hydrophthalmic eye.

5. The motions of the eye are performed with more and more difficulty, in proportion as it increases in size. At the same time, it becomes harder to the feeling, and the sclerotica, necessarily forced to partake in the extension of the cornea, becomes thin, and appears blue, as in young children.

6. After a time, the pupillary edge of the iris contracts adhesions to the capsule, which has become opaque; the cornea is very flexible, and the sclerotica boggy; the iris is torn and absorbed, in consequence of the dilatation of the surrounding parts. The eye becomes partially atrophied; the retina is quite insensible.

Causes. Except when this disease results from some evident injury, or ophthalmia, its causes are obscure. The sudden suppression of cutaneous eruptions has been mentioned as a cause.

Prognosis. Arising from corneitis, or aquo-capsulitis, dropsy of the aqueous chambers generally remains unchanged through life; but when it is the consequence of an injury, or depends on some cachexia, it is apt to degenerate into general dropsy of the eye.

Treatment. 1. When the disease is the result of an injury, much advantage will be derived from a succession of blisters to the temple, and behind the ear; and from the use of mercury combined with purgatives.

2. If the suppression of an eruption, especially one to which the patient has long been subject, and which has been attended by a discharge, be the suspected cause, an artificial eruption, by means of friction with tartar emetic ointment, is plainly indicated.

3. In the incipient stage, and especially when the disease is of local origin, friction round the eye with murcurial ointment has been found useful.

4. If the disease is advanced, and vision much affected, but the sclerotica not yet discoloured by being involved in the distention of the eye, paracentesis oculi ought to be employed.[1] An incision may be made through the cornea, two lines long, and at the distance of half a line from the sclerotica. Beer recommends not merely that the aqueous humour should be evacuated in this way, but that the wound should be re-opened every day, for a number of successive days, or even weeks. More than once, he had observed general remedies to have a good effect after this operation, although they had had none before. If it is not successful in curing the disease, it proves at least a palliative; and if too large an opening is not made, may be frequently repeated with advantage.

§ 2. *Sub-Sclerotic Dropsy.*

I have already had occasion (page 491) to state that a watery effusion between the sclerotica and the choroid, or between the choroid and the retina, is by no means an uncommon result of inflammation.

Although the internal surface of the sclerotica is connected to the external surface of the choroid, by numerous vessels and nerves, passing between these tunics, it is evident, that a fine membrane is expanded over these surfaces. Within the cavity formed by this membrane, a serous fluid sometimes accumulates, so as to constitute what we may term sub-sclerotic hydrophthalmia.

The symptoms of this disease will in some respects resemble those arising from a dropsical effusion between the choroid and the retina; and will, like them, derive relief from the operation of puncturing the eye, and allowing the collected fluid to escape.

§ 3. *Sub-Choroid Dropsy.*

I need not repeat what I have said regarding the symptoms of choroiditis, which in general will be found to have preceded, or to accompany, sub-choroid hydrophthalmia. This disease appears also to originate sometimes in arthritic ophthalmia.

Cases of sub-choroid dropsy, proceeding so far as to cause absorption of the vitreous humour, and compression of the retina, have been described by many observers.[2] The progress of the dropsical effusion, and the symptoms by which it is accompanied are by no means alike in all cases. When the accumulation takes place slowly, the loss of vision is gradual, and the attending pain and redness are not severe. But if the water is collected quickly, it is accompanied with great pain both in the eye and head. There

may be no enlargement of the eye under such circumstances. But, in other cases, the choroid, pressing against the sclerotica, produces attenuation of the latter, while the eyeball undergoes either a general or partial extension; the pupil becomes dilated and sometimes displaced; and when the disease is far advanced, there appears an opaque body behind the pupil, which is nothing else than the retina compressed into a cone, the apex of which is at the entrance of the optic nerve, while the basis surrounds the lens. Mr Wardrop[3] mentions, that in one instance this appearance was mistaken for cataract, and an attempt made to couch it; a fruitless operation, which gave great pain.

Treatment. In suspected cases of sub-choroid hydrophthalmia, there can be no doubt of the propriety of following the practice of Mr Ware, and puncturing the eye at the usual place of passing the cataract needle through the sclerotic and choroid coats. Mr Ware recommended a grooved needle for this purpose, so that the fluid might more certainly escape, but a better plan is to puncture with Saunders' cataract needle, and then hold the edges of the wound apart by means of a small probe. Care must be taken in making the puncture, to direct the point of the needle, so that it may not wound the posterior part of the crystalline capsule. The operation may be repeated from time to time should the symptoms seem to demand it.

The first case related by Mr Ware, affords a good example both of the disease and of the relief afforded by paracentesis.

Case 245.—A lady of about 45 years of age, perceived a dimness in her left eye, the cause of which she was not able to assign. She supposed it to have been the consequence either of taking cold, or of the cessation of a discharge from one of her legs, to which she had been subject for a considerable time. The dimness was discovered accidentally, on her attempting to see an object with the left eye whilst the right was shut, and in a short time the sight afforded by that eye rendered her no assistance; objects when placed straight before her being invisible, and their appearance, when removed to the outer side of the axis of vision, being obscure and indistinct. The eye had not altered its appearance in any respect, the pupil being neither cloudy nor dilated. In December 1804, about two years after the dimness was first perceived, she began to feel pain in the eye, and it became slightly inflamed. Although the inflammation never appeared to be considerable, the pain rapidly increased to a most violent height, affecting, in a few days, both the eye and the head, and proving particularly severe during the night. The pupil now, for the first time, became dilated, and had a misty appearance; but the degree of opacity was very insufficient to account for the total loss of sight.

Leeches, blisters, fomentations with poppy heads, and a free use of opium internally were repeatedly tried, but did not afford any relief. The internal employment of the muriate of mercury was equally ineffectual. The progress of the disorder, and the state of the patient at this period, closely resembling those of another patient, in whose eye, after death, Mr Ware had found a sub-choroid collection of thin fluid, with coarctation of the retina, led him to think that the violent pain which this lady suffered might depend on a similar state of the eye. It also occurred to him that if the effused fluid could be discharged, it might be a means of affording relief. The operation seemed neither impracticable nor difficult, and the patient readily acceded to submit to it, as indeed she would have done to any operation, whatever might have been its hazard, so extreme was the pain she at that time endured.

Mr Ware introduced a common spear-pointed couching needle through the sclerotica, a little farther back than where it is usually introduced for the purpose of depressing a cataract. As soon as the instrument entered the eye, a yellow fluid escaped, sufficient in quantity to wet a common handkerchief quite through. The needle was kept in the eye about a minute, in order to afford the fluid a more ready exit; and as soon as it was withdrawn, the discharge ceased. The tension of the eye was considerably diminished by the operation. A compress dipped in a saturnine lotion was bound upon it, and the patient put to bed. She continued in pain about ten minutes, but then fell into a sound sleep which lasted upwards of two hours; and on awaking, her eye was quite easy. The compress was again moistened with the saturnine lotion, and she took some nourishment. She passed the next night very comfortably, without the assistance of laudanum, although previously it had been given her in large doses. The same application was continued to the eye, which afterwards remained perfectly easy, with scarcely any appearance of inflammation. The pupil continued dilated, but did not become opaque. About three weeks after the operation, the patient caught a cold, and complained that the eye felt more tender than usual. Mr Ware was alarmed lest a fluid might again be effused in the old place, and the pain return; but this was happily prevented by the application of a blister on the side of the head.[4]

§ 4. *Dropsy of the Vitreous Body.*

Vitreous dropsy is characterized by the following symptoms:—

1. An increase of size, chiefly behind the cornea, which is pushed forwards without undergoing any other change, while the sclerotica bulges out between the recti, so that the eye becomes somewhat of a square shape.

2. The aqueous humour diminished in quantity, and the iris pressed into contact with the cornea; the iris not changed in colour, nor the pupil extremely dilated.

3. The eye feels excessively hard.

4. The sclerotica, from distention, assumes a deep blue colour.

5. Weakness of sight, soon followed by complete amaurosis, so that not even the least sensibility to light remains.

6. The movements of the eye are much sooner impeded than in aqueous dropsy. At last, it becomes altogether motionless.

7. There is pain in the eye from the very commencement. It daily increases in violence, and spreads to the half of the head, to the teeth, and to the neck. At last the patient becomes almost mad with the pain, and calls upon the surgeon to evacuate the contents of the eye. Beer saw a man who did this for himself with his penknife.

8. Even when the pain is comparatively moderate, the patient's sleep and appetite entirely fail.

Causes. Except in cases of injury, these are equally obscure as those of dropsy of the aqueous chamber. A scrofulous or syphilitic cachexia is blamed, or a union of both is sometimes suspected.

Treatment. General remedies may be directed against the particular cause which is supposed to give rise to the disease; but most relief is derived from diminishing the quantity of the vitreous humour. In one case, resulting from an injury, and in which the lens was opaque and displaced, I succeeded in curing the vitreous dropsy, by repeatedly tapping through the cornea. But in general, this oper-

ation is to be performed through the sclerotica and choroid, as in cases of sub-choroid dropsy. The vitreous humour, when the puncture is made, is apt, as in choroid staphyloma, to infiltrate the sub-conjunctival cellular membrane to an enormous extent, sometimes to such a degree that the cornea is hid by the swelling. In one case, in which this event happened in my hands, the pain which ensued was very severe; but the dropsy was cured by the continued pressure, exercised for 10 or 12 days, on the empty eyeball, by the fluid lying under the conjunctiva. Repeated punctures of the sclerotica produce inflammation of the interior of the eye, ending in a destruction of the secreting power. Sometimes the inflammation is more severe, bringing on adhesions of the iris, and opacity of the cornea. The eye becomes atrophic, soft, and free from pain.

Should repeated paracentesis fail, the mode recommended by Beer will require to be adopted; namely, to make a section of the cornea, as in the operation of extraction, and evacuate the lens and part or the whole of the vitreous humour, after which the coats of the eye gradually shrink to a small size.

§ 5. *General Hydrophthalmia.*

Both the aqueous and the vitreous humours may be increased in quantity at the same time, so that the whole eye is greatly enlarged, in which state the name *buphthalmos* has been bestowed on it, from its resemblance to the eye of an ox.

This disease presents a union of the symptoms of the first and fourth varieties of hydrophthalmia, as far as they can co-exist. When congenital, it is often accompanied with opacity of the cornea. If it occurs in after-life, and if rapid in its progress, it is attended by excessive pain; the motion of the eye is lost; the patient is deprived of sleep, and appetite for food, and becomes delirious; if the case is neglected, caries of the orbit may even take place, and the patient die, worn out by fever.

Beer had met with this disease only in extremely cachectic, and especially scrofulous and scorbutic subjects.

Congenital cases sometimes do well, without any treatment, the cornea gradually clearing, and the eye shrinking to its natural dimensions.[5] In other cases, the disease continues moderate till the period of puberty, when the eye suddenly enlarges, the pupil, widely dilated, contracts adhesions to the capsule, which becomes opaque, the iris is lacerated by the stretching to which it is subjected, the retina loses its sensibility, and after a time the eye becomes soft and atrophic.

Mercury, squills, digitalis, and counter-irritation have been recommended; but I should place greater confidence in tonics. If other remedies fail, evacuation of the contents of the eye must be had recourse to, as in vitreous hydrophthalmia.

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[1] Nuck, De Ductibus Oculorum aquosis; p. 120; Lugduni Batavorum, 1723.
[2] Zinn, Descriptio Anatomica Oculi Humani, p. 25; Gottingæ, 1780. Scarpa

[1] Trattato delle Malattie degli Occhi, Vol. ii. p. 172; Pavia, 1816. Ware's Observations on the Treatment of the Epiphora, &c. p. 284; London, 1818. [2] Wardrop's Morbid Anatomy of the Human Eye; Vol. ii. p. 65; London, 1818.

[3] Op. Cit. Vol. ii. pp. 67, 274.

[4] Remarks on the Ophthalmy, &c. p. 233; London, 1814. See also Ware's Observations on the Cataract, and Gutta Serena; p. 443; London, 1812.

[5] Ware's Observations on the Treatment of the Epiphora, &c. p. 285; London, 1818.

SECTION III.—SANGUINEOUS EFFUSION INTO THE EYE.[1]

Effusion of blood into the aqueous chambers frequently follows a blow on the eye. Smaller quantities of blood are sometimes seen to accompany hypopium, especially that which arises from the bursting of an abscess of the iris. Wounds of the iris are generally attended by a discharge of red blood; and the same is observed when the iris is torn from the choroid, either accidentally or for the purpose of forming an artificial pupil. Blood is also occasionally effused into the substance of the cornea, and on the surface of the iris, in consequence of inflammation, especially in syphilitic and arthritic cases.

To such occurrences as these, I do not mean any further to direct the attention of the reader; but to an internal hæmorrhagy of the eye, which appears neither to arise from injury, nor to depend altogether on inflammation, and which sometimes has been called *apoplexy of the eye*. This hæmorrhagy may occur either in an eye apparently sound, or in one which has suffered from previous disease.

Case 246.—A carter, whom I had seen, some years before, with lenticular cataract in the right eye, the effect of a blow, called on me in March 1836, with the anterior chamber of the eye half filled with blood. He attributed this to working hard during three successive nights. In three days more, the anterior chamber was completely filled with blood, so that the cornea appeared of a dark chocolate colour. There was slight sclerotitis, with heat and pain of the eye, and headach. I advised rest, with cold applications to the eye, and abstinence from spirituous liquors, to which the patient was rather addicted.

As the instances of this affection, recorded by authors, are few in number, I shall quote some of the most interesting of them.

The first case which I shall quote is by Mr John Bell, and affords an example of this disease occurring in an eye previously healthy.

Case 247.—"Mr A——, though not yet 20 years of age, is more than six feet high; and three years ago, when first he was struck with this singular kind of blindness, was growing so rapidly, that he actually believes he gained five inches in the year. He was then a stripling, and is now tall, slender, and delicate in his constitution, though remarkably well formed, and destined to become a strong and muscular man. Early in the month of September 1803, on the day on which he was first attacked with this blindness, he had his hair cut early in the morning, he ate very heartily a hurried dinner, when, a companion having called while he was yet at table, and proposed a party in a house at some distance, he went with him, and being mere lads, and in a playful humour, his friend ran, and he pursued at full speed, for the space of three or four hundred yards; he instantly was sensible of his sight being dim in the left eye; he disregarded at

first a feeling which he imagined to be temporary, but, having arrived at the house, and sat down, he was alarmed to find his vision still more obscure, and, turning round to those who were in company, he asked whether they perceived any thing wrong in his eye; they said they saw blood upon it; upon looking into a mirror he saw the blood, found himself totally blind of the left eye, was assailed with dreadful pain: the bloody effusion took place, the blood became visible, and the vision was entirely obscured in the short space of 15 minutes; then the violent pain began, a consequence plainly, and not a cause of the blindness, and for 10 days he continued entirely blind of that eye.

"His vision was gradually restored, by the blood which had filled the whole of the anterior chamber of the eye, subsiding below the level of the pupil: the blood was still visible in the lower part of the eye, and continued so for three weeks; it gradually vanished, and the eye recovered its wonted appearance, except that, in the very lowest part, under the level of the pupil, there remained a little white matter, viz. the gluten of the effused blood. Such was the first attack of the disorder, from which he continued free for the space of six months.

"In the month of May 1804, one evening while sitting at supper, not conscious of any previous excitement, from violent exercise or exposure to heat, but probably affected by the supper, wine, light, and heat, and animated conversation, he suddenly perceived the obscurity coming over his vision, the blood again appeared in the chamber of the eye, which was next morning affected with violent pain: yet this was, in all respects, a less severe paroxysm than the first.

"Little more than a month had elapsed, when having, in the warm month of June, gone into the river to bathe, he was in the act of swimming and just when coming out of the water, struck with this obscurity of vision. The blood instantly came over his eye, which, on the ensuing day, was affected with most excruciating pain, extending to the temple; but in three weeks or a month, his sight was completely restored, and the eye had recovered its natural splendour and clearness. In the end of September, or beginning of October, he was again attacked, though he was conscious of no excess, and was quiet, regular, and discreet in his way of living; he was seized while writing, and recollects no sensible cause to which the paroxysm could be ascribed, unless it were to the hanging of the head and straining of the eye. The sight was obscured, the blood appeared again in the chamber of the eye, the pain returned, the blood was absorbed again within the usual period, and the sight was in course restored.

"It was on the 1st of November, in walking across the bridge at night, betwixt 10 and 11 o'clock, that he sustained the fourth attack, but without such total loss of vision, or so much effusion of blood as heretofore, and certainly the blood was not so long of being absorbed, nor was he so long obliged to cover the eye from the light: in eight or ten days he was able to uncover the eye, the appearance of suffusion of blood was gone, but the lymphatic coagulum, occupying the anterior chamber of the eye, was manifestly accumulating. On the 3d of February 1805, he had a like paroxysm, arising from very obvious causes; being a day of election of Member of Parliament for this city, his regiment was marched out of town to the distance of 18 miles: and both in marching out to the temporary quarters allotted for his regiment, and in returning, he walked along with the men, was greatly heated by the exercise, and very naturally refers this attack to a cause so expressly resembling that which first gave rise to his malady, that it could not fail to attract his particular notice. 'From this time,' says Mr A. ——, 'these paroxysms became periodical, and seemingly spontaneous; they returned once a-month, the eye was kept in a state of constant irritability and frequent pain, so that I was forced to have it constantly covered from the light; yet no circumspection in this respect, nor in my habits of living seemed to avail me. Of the few paroxysms which I am able to particularize, as arising from any obvious excitement, one was on the morning after our review, in the month of August last, when, after being in the field, we sat down to a dinner of ceremony, and drank late; I must have exceeded, but am not conscious of having been intemperate; I went to bed, perhaps a little heated with wine, I rose early in the morning to go upon guard, and, in the act of dressing, and especially in stooping to wash my face, I was sensible at the instant of the effusion of blood, and the return of the blindness.' The second memorable occasion was still more particular

in the circumstances, the excitement more marked than any, and explaining all of the others: Mr A—— had gone abroad to a supper party of young people, where a most unusual degree of hilarity prevailed, some very ludicrous songs were sung, and he joined the general mirth, and laughed immoderately, and so long, that in the end he saw the candles dim, and, in a moment, found his eye quite suffused with blood.

"This gentleman's disease has now taken a most decided form; it returns sometimes once a-fortnight, sometimes once a-month, seldom do two months elapse without a new effusion of blood; and it returns with a degree of regularity almost periodical. The sensibility of the eye is such, that he is obliged to keep it always shaded; and each new effusion of blood is now followed by a paroxysm of pulsatory pain in the temple of that side, with an intolerable throbbing, something betwixt general headach, and pain of the affected organ, a pain which is in some degree relieved by steady and continued pressure. Sometimes, as you will learn from the narrative, the excitement is sensible, and the cause of it such as in strict prudence he should have avoided, but it is often too slight to be observed; now the effusion returns always, or almost always, without an express or sensible cause, from a predisposition so strong, that he is come to a conviction, that laughing, crying, singing, running, swimming, stooping, excess in wine, or any of those causes which have at former times plainly produced this effusion, would cause it instantly to return.

"It must seem very surprising, that an organ so delicate as the eye, should be able thus to sustain repeated effusions of blood, without having its structure entirely ruined; but the resistance of its strong coats, filled and tense with its own humours, plainly has its effect in limiting the bloody effusion, yet the additional tension is such, as occasions that violent pain which is excruciating even on the first, and at its acme, the second day after the effusion has taken place. That the extravasation is of pure blood, which keeps its properties unaffected by the dilution with the aqueous humour, is both sensible to sight, and proved by the sensible white coagulum, which each successive effusion leaves behind. * * * * Its form is in no degree changed; if there were the slightest reason to apprehend any alteration of bulk or form, it is from the eyelid being drawn down, and that somewhat obliquely over the eye, so as to cover much of the cornea, or coloured part, and exposing chiefly the inner side and lower part of the eye, where the coagulum lies. The blood of its proper purple colour obscures the whole; the pupil is not to be seen, the coagulum which, in consequence of its bulk, is very thinly covered with the blood, is almost white, and occupies all the lower part of the anterior chamber of the aqueous humour, occupies the space betwixt the lower half of the iris and the cornea, covers some part of the pupil, and has, I fear, irremediably injured the vision, which yet is not extinct; but strict regimen, profuse evacuations, a seton in the nape of the neck, and opiates to appease the sensibility of the eye; an abstemious, quiet, and regulated course of life, will, I hope, prevent future effusions; and when his growth is ascertained, and these paroxysms of local arterial action are abated, I hope that much of this coagulum will be absorbed."[2]

Dr Boxwell, of Abbeyleix, communicated to Dr Graves the particulars of a case of purpura hæmorrhagica, in the course of which an effusion of blood took place into both eyes.

Case 248.—The patient was a young lady of 13 years of age. In the right eye, the blood was extravasated, in the first instance, somewhere behind the iris. As the pupil had a blood-red appearance when the impairment of vision commenced, and as at that time there was no discoloration or muddiness in the anterior chamber, Dr Graves concludes that the first hæmorrhagy was into the vitreous humour; for, says he, "had blood been effused into the posterior chamber, in such quantity as to impart to the pupil a blood-red appearance, it must have tinged strongly the fluid in the anterior chamber." Vision became worse and worse in the right eye, and was extinguished in about five hours, at which time the aqueous humour was evidently mixed with blood. Next day, the other eye became similarly affected, and the young lady continued totally blind, until

her death, which took place in about a week afterwards, under the following circumstances:—

The disease commenced with severe pain in the hip-joint, increased on the slightest motion. At first she appeared to be relieved by baths, calomel, and James's powders, followed by purgatives; but as the pain returned with increased violence, twelve leeches were applied over the hip-joint. Dr Boxwell returned in two days to see the patient and found the bleeding from the leech-bites had continued in spite of all the efforts of her attendants, ever since he left her. She was pale, and exhibited the appearance of a person exhausted by bleeding. Her pulse, however, was not feeble; it was quick and bounding, as it is in many cases after copious loss of blood.

From that period her complaint assumed the character of purpura, attended with discharge of bloody urine. No other hæmorrhagy took place, except that already described into the eyeballs. The bleeding from the leech-bites had completely removed the pain from the hip-joint, but she now began to complain of intense pain in the head, accompanied with throbbing, nausea, and total loss of appetite. The headach became every day more excruciating, and the discharge from the bladder greater. No medicine, no local application diminished the agony she suffered from pain in the head. She died on the 14th day from the commencement of her illness, exhausted by pain and loss of blood, having retained her intellects to the last, and without the least sign of paralysis, coma, convulsions, or any other symptom denoting effusion of blood within the cranium.[3]

In the following case, effusion of blood occurred in an eye, which had previously suffered disorganizing inflammation.

Case 249.—Caroline Pilsen, nine years of age, and of a scrofulous habit of body, came under the care of Dr Ammon in July 1829. Vision had been dim for some months. On examination, it was discovered that the left eye was quite blind, and affected with strabismus; and the right eye very myopic. The cornea of the right eye had lost much of its convexity, and the iris, which was of a yellowish green colour, projected unnaturally into the anterior chamber. The pupil was irregular, angular, and much contracted. In the left eye, the outer portion of the iris was much broader than the inner, the pupil was oblong, and appeared angular, especially towards the inner side. The iris was of a brownish green colour, and a great many vessels were seen running from its ciliary to its pupillary edge. The pupil of this eye daily became larger, and the sensitiveness of the eye increased, so that examination of it was difficult.

One day when the sensitiveness of the eye was less, as Dr Ammon was examining it, he perceived that the pupil was nearly natural, but that on the inner circle of the iris there was a deposition of black matter, which was so deep in its tint that he at first thought the iris had been removed by absorption at that part. He also observed that the lens was dislocated inwards, so that one half of it was concealed behind the inner part of the iris and sclerotica, whilst the other half lay with its outer edge right in the centre of the pupil. Through that part of the vifreous body which was exposed by this displacement of the lens, a whitish-gray appearance was seen at the bottom of the eye.

Some days after this, Dr A. found the girl lying on her face asleep. When she awoke, he was surprised, on examining her eye, to see a quantity of blood in the anterior chamber, and the whole cornea quite red. Examining the eye next day, the extravasation of blood was found to have disappeared. Dr Ammon, having made the patient bend her head forwards, and keep it so for some minutes, found the anterior chamber almost quite full of blood, which moved from one side to the other with the motions of the head. Some spots of the blood adhering to the iris, on being examined with a lens a few hours after, were found to have become dark in colour, next day to have changed into a brown colour, and in a few days to have become almost quite black. These spots, when once formed, did not disappear, unless they were on the ciliary edge of the iris, and very small. This state of the eye continued for nearly two months, and the slight degree of vision which previously existed became wholly extinguished. The cornea retained its transparency, but grew flatter and flatter, and the black colour of the edge of the pupil and of the rest of the iris increased.

In February 1830, the girl had a slight inflammatory fever, and then it was remarked that the ecchymosis in the eye increased much, and that it more quickly blackened the anterior surface of the iris. The extravasation of blood ceased at length under the use of tincture of iodine.[4]

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[1] *Hæmophthalmos.*

[2] Principles of Surgery; Vol. iii. p. 270; London, 1808. See a similar case related by Walther in his Merkwürdige Heilung eines Eiterauges, p. 61; Landshut, 1810.

[3] Dublin Journal of Medical Science; Vol. xi. p. 395; Dublin, 1837.

[4] Zeitschrift für die Ophthalmologie; Vol. i. p. 103; Dresden, 1830.

SECTION IV.—NON-MALIGNANT TUMOURS OF THE EYEBALL.

In the ninth, tenth, eleventh, and twelfth sections of Chapter IV. I have described certain excrescences and tumours of the membrane lining the eyelids, and investing the anterior surface of the eyeball, which, in general, will easily be distinguished from diseases originating in or within the proper tunics of the eye.

It is of great importance to be acquainted with the fact, that different textures of the eye are apt to be affected with depositions, tumours, and fungous degenerations, which are not malignant, and which sometimes subside of themselves. There is reason to think, that such growths have often been mistaken for malignant diseases, and especially for fungus hæmatodes.

Varieties. 1. In some cases, it is probable that depositions of blood, lymph, or pus in different textures of the eye, assume the appearance of fungous growths. Some of these depositions are capable of becoming organized, and this may add to the resemblance they will bear to certain tumours. 2. In other cases, I think it extremely probable that scrofulous tubercles, exactly similar to those frequently met with imbedded in the cerebrum of children dying hydrocephalic, form upon or within the eye; for instance, in the substance of the sclerotica, iris, or choroid. Such tubercles, lying deep in the eyeball, will with much difficulty be distinguishable from fungus hæmatodes. 3. Albuminous tumours, similar to those which grow in the skin of the face, and eyelids, and under the conjunctiva, (See pages 154, 238) are sometimes found attached to the sclerotica. 4. Encysted tumours are met with in the interior of the eye.

§ 1. *Non-malignant Tumours of the Sclerotica and Cornea.*

I have seen several cases of albuminous or scrofulous tumours, originating from the sclerotica, sometimes single, sometimes in clusters, soft in some cases, and firm in others, but with little or no vascularity. The subjects of such affections were always cachectic children, and the affected eyes had generally suffered from internal scrofulous ophthalmia before the appearance of the

tumours. Several of the patients died of chronic disease of the lungs.

Case 250.—A girl, about seven, had several albuminous tumours on the cheek and chin, and a tumour on the temporal side of one of her eyes, which seemed also albuminous. The conjunctiva covering it gave way, and the tumour enlarged to the size of a hazel-nut. It was of a white colour and soft consistence, and evidently involved the sclerotica. The patient died of tubercular phthisis.

Case 251.—A young lady, about 12, had a scrofulous tubercle attached to the upper part of the sclerotica; the eye had suffered much from scrofulous internal inflammation; the tubercle was of a yellow colour, it slowly enlarged to the size of an almond, and seemed in a state of suppuration, but did not actually suppurate. The general health was much impaired, and I learned that the patient died soon after the occurrence of the symptoms above mentioned.

Case 252.—A girl was brought to me for advice, who presented a cluster of scrofulous tubercles on the lower half of the sclerotica, close to the cornea. The vision of the eye was dim, the cornea hazy, and the pupil was dragged towards the side of the eye on which the tumours were situated. This patient was benefited by the application of leeches.

The following case is an example of a non-malignant tumour of a different character:—

Case 253.—The cornea of the left eye, in a woman aged 46, had for two years been opaque from chronic inflammation, when, after a severe attack of fever, the surface of the eye began to be covered by a vascular fungoid tumour. On her admission to Guy's Hospital, it was of the diameter of a shilling, covering the cornea and part of the sclerotica, and protruding between the eyelids. It was slightly lobulated, and of a dark purple colour; it sometimes bled but was never painful. The eye was extirpated by Sir Astley P. Cooper.

On dissection, the tumour was found to be situated without the globe. It was pulpy, vascular, and of an unequal dark colour; of a square figure; formed of various lobes, separated by delicate fibrous bands; and adhered to the sclerotica and the margin of the cornea, both of which could be traced entire beneath the tumour.

The globe being divided, the vitreous humour escaped in a liquid state and of a yellow colour. The lens had disappeared. Within the globe and opposite to the external tumour, there was another smaller growth which had no communication with the former, and consisted of a softer, very vascular substance. It occupied the lower and anterior part of the globe, raising and compressing the retina, and was distinctly situated between the layers of the choroid coat.[1]

§ 2. *Non-malignant Tumours of the Iris.*

The non-malignant tumours of the iris, which I have seen, are of two kinds, the one encysted and the other solid.

In one case, I saw a cyst form in the iris in consequence of a wound. It was semitransparent, and apparently filled with a thin fluid, but as it was not increasing in size and gave no pain, it was not interfered with.

The solid tumour of the iris is distinctly described by Delarue,[2] under the head *Des Excroissances charnues de l'Iris*, and numerous cases of it are recorded. It appears to be, in general, a scrofulous tubercle.

Case 254.—A pale, weakly female child, seven or eight years of age, labouring under caries of the left foot, was brought to Dr Ritterich on account of a complaint in her right eye. Along with slight intolerance of light, and moderate redness of the conjunctiva, he found a white elevation at the pupillary edge of the iris, but not entirely embracing it. The iris, everywhere else contracted, was at this place dilated, and the pupil immovable. The patient did not see with this eye, and complained now and then of pain in it. After a time, the

swelling extended to the ciliary edge of the iris, and at the same time involved its pupillary edge. It also approached closer to the cornea. Dr Ritterich at first considered the disease an abscess, but he found, on attempting to evacuate it through the cornea, that it was a fungous excrescence of the iris. For a long time after this, he did not see the patient, and when he did see her, he found the tumour much increased, so that, fearing it might implicate the whole organ, he proposed to remove the front of the eyeball. But the patient was not brought back to him for a year, when he found the eyeball atrophic, and instead of the cornea, a thick cicatrice. The health of the girl was improved, and her foot so well that she could walk; several pieces of bone had come out of it. The mother said that the cure took place spontaneously.[3]

Case 255.—On the inferior part of the iris, in a boy about three years old, a small patch of lymph was deposited. The pupil was not influenced by it, but moved as usual. There was no ophthalmia, nor any irritability to light. In a fortnight the mass of lymph was so much increased that it occupied the inferior half of the anterior chamber. A process of organization now commenced in the lymph, and an action analogous to inflammation was set up in the cornea. It became turbid and vascular, the iris and cornea united, a blue mass arose in the situation of the ciliary ligament, which, together with the whole of the cornea, ulcerated or suppurated, and an ill-conditioned and very luxuriant fungus shot forth. By degrees the fungus diminished, and finally the eyeball healed.[4]

Case 256.—In a boy, about eight or nine years of age, Mr Lawrence saw an apparently simple vascular growth of a light brown colour, equal in size to a small pea, proceeding from the iris, without much redness or pain, and without opacity of the pupil. It caused ulceration of the cornea, and thus appeared externally. As the patient was removed to his residence in the country, Mr Lawrence did not witness the termination of the case, but he was informed that the tumour subsided after a time, and that the eye shrunk.[5]

Case 257.—Sarah Macniven, aged 19, was admitted at the Glasgow Eye Infirmary, 17th February 1835. About five weeks before her admission, her left eye had been considerably inflamed, with pain in the eye and circumorbital region. The conjunctiva and sclerotica were injected with blood, the cornea slightly nebulous, the iris somewhat changed in colour, vision very imperfect, and the motions of the pupil sluggish. At the bottom of the anterior chamber, there was a yellowish mass, having much the appearance of pus, with reddish streaks, as if from blood-vessels, passing over its surface. This yellowish substance gradually increased in size, and assumed the appearance of a scrofulous tubercle. It caused an elongation of the cornea downwards, so that the cornea had an oval shape. The tumour diminished considerably, and the inflammatory symptoms subsided, under the internal use of mercury, quina, and belladonna. The patient was now seized with insomnia, spectral illusions, delirium, and loss of motion of the right arm. She died on the 11th April. Permission could not be obtained to inspect the body; but it is not improbable, that other scrofulous tubercles existed within the cranium, similar to the one attached to the iris.

Case 258.—Maître-Jan relates the case of a soldier, whose eye was completely covered by a fleshy excrescence, which he compares to a mushroom, and which projected even from between the eyelids. He destroyed it by the repeated application of one part of corrosive sublimate with four of dry crust of bread, after which he discovered that its root was narrow, forcing its way through an ulcer of the cornea, and arising from the iris. Under the continued use of escharotics, the front of the eye sloughed, and the lens and vitreous humour were evacuated, after which the pain ceased, and the ulcer cicatrized.[6]

§ 3. *Non-malignant Tumours of the Choroid and Corpus Ciliare.*

I have ascertained that the posterior part of the choroid is sometimes the seat of a tumour, which is probably of the nature of scrofulous tubercle. It separates the membrane into two laminæ, between which it is deposited. Much more frequently have non-malignant growths been observed in the anterior part of the choroid.

Case 259.—A child, about six years old, came under Mr Lawrence's care at the London Ophthalmic Infirmary, with external inflammation of one eye, attended with so much swelling of the palpebræ, that the exact state of the globe could not be ascertained. Heat of skin, quickness of pulse, furred tongue, great pain in the head and eye, restlessness, and want of sleep, showed the local inflammation to be serious. At the end of three or four days, after the use of leeches and suitable internal means, Mr Lawrence succeeded in obtaining a view of the eye, in which there was vivid external redness, with a dull state of the cornea; the iris was pushed forward, and the pupil partially opaque. In spite of antiphlogistic means, the child continued to suffer. A tumour gradually arose behind the edge of the cornea; it was of a yellowish colour and acquired the size of a horse bean. Subsequently, two or three other projections took place, of smaller size, arranged with the first, in a regular series, at a short distance from the margin of the cornea. The inflammation still continued severe, although leeches and aperients were frequently used. At length the inflammation abated, the pain became less, the protuberances diminished in size, the cornea shrunk completely, the eye became atrophic, and the child recovered without any farther ill consequences.[7]

Case 260.—A girl, about ten years old, was brought to Mr Saunders, for the purpose of obtaining an opinion whether she was blind. Of that there was no question, as the affected eye gave no sign of vision.

The sclerotica was unusually vascular, but not inflamed. The vessels were large and serpentine. The iris seemed to be twice as far from the cornea as is natural. The pupil was dilated, and the iris contained many distinct red vessels. The cornea, the aqueous, crystalline, and vitreous humours, were at this time transparent. In the course of a few weeks, the crystalline became opaque, and the iris, covered with lymph, and as red as if injected, advanced towards and touched the cornea. Shortly after, a blue excrescence was thrown out at the superior part of the eye, at that part of the sclerotica which unites with the ciliary ligament. It increased rapidly, and became as large as the anterior portion of the globe. It ulcerated, and for a long time a thin watery fluid was discharged, then pus, and ropy lymph. After some months, the aperture closed, the eyeball, much reduced in bulk, became tranquil, and even retained some vestiges of the cornea, the blue excrescence being totally extinct. During this process, there was nothing like acute inflammation, and the pain was very trivial.[8]

Case 261.—A scrofulous child had scrofulous ophthalmia for a year, with an ulcer at the lower edge of the cornea, which gave way. Through the opening, a hard, irregular, reddish-white swelling gradually protruded. Atrophy of the bulb and tabes mesenterica supervened about the same time, and soon after subacute hydrocephalus.

The eye was examined by Jäger, who ascertained that the disease arose from the corpus ciliare, and that the other textures, although atrophied, were not connected with the tumour, which had spread outward, between the iris and cornea.[9]

Case 262.—A woman, aged 40, of arthritic diathesis, applied to Professor Rosas, on account of a fungus in the anterior chamber, which appeared to arise from the ciliary processes, and involved a third of the iris. The rest of the iris, with its pupillary edge, was healthy, as well as the other textures of the eye. With the extraction knife a flap was formed in the external-inferior part of the sclerotica, about half a line from the edge of the cornea, and the fungus cut out, along with which came the lens, and a portion of the vitreous humour. In some weeks the wound was healed, the cornea remained flattened, and at its inferior-external part, nebulous; looking downwards into the eye, the pupil was observed dilated, vision was confined to a mere perception of light, and no trace of the growth remained.[10]

§ 4. *Encysted Tumour in the Posterior Chamber.*

Case 263.—A lady was affected with considerable pain in one of her eyes, which presented the appearance of a small vesicle pushing into the anterior chamber from under the ciliary margin of the iris behind the lower edge of the cornea. The vesicle gradually increased, separating the iris more and more from the choroid, and the pain became severe. I punctured the vesicle, or encysted tumour,

with the iris knife through the cornea. A minute quantity of fluid was discharged from the cyst, which immediately contracted so much that it was no longer visible. The pain was removed. The wound made in the cyst healed, it filled again with fluid, and again appeared (*Fig.* 67.) in its former situation, but larger than before. I punctured it a second and a third time, at intervals of six and eight weeks. After the third puncture, it did not fill again. The iris returned to its natural place; the pain ceased entirely; and vision was preserved.

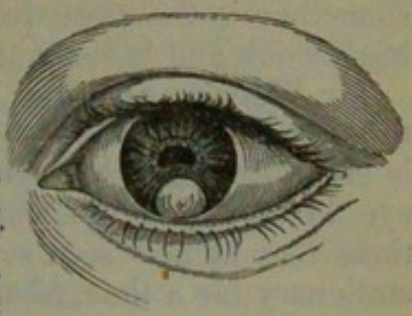

Fig. 67.

§ 5. *Non-malignant Depositions or Tumours occupying the place of the Vitreous Humour.*

It may now be regarded as a generally received opinion, that frequent instances occur of changes of structure deep in the eyeball, producing all the visible appearances of fungus hæmatodes of the eye, but which do not turn out to be malignant. Such cases are not uncommon after injuries. They constitute a diseased state of the eye, which Beer included along with some other conditions of the deep-seated parts of that organ, under the name of *Amaurotic cat's eye.*

If we extirpate such eyes, under the notion that they are affected with fungus hæmatodes, the patient will continue well, and we shall fall into the error of supposing that our operation has been an exception to the general failure which attends the removal of the eye in that disease. This error has probably been committed by Mr Wishart[11] and by Mr Porter,[12] in two cases which have been given to the public. In Mr Wishart's case, the disease in the eye arose from a blow; in Mr Porter's case, the fungus was partially contained in two cysts; in both cases, the optic nerve was sound; all of which circumstances lead me to suspect that they were not cases of fungus hæmatodes. In the second edition of this work, printed in 1834, I stated that in the case of an adult, whose eye I had extirpated four years before, there had been no return of fungus hæmatodes. The patient referred to still continues well, but a re-examination of the extirpated eye, and a comparison of the symptoms with those of some non-malignant cases which I have since seen, or of which I have read, have led me to regard the case as probably not one of fungus hæmatodes. The facts that one of the fungous masses was contained between the laminæ of the choroid, and that the other which occupied the place of the vitreous humour, and was attached to the termination of the optic nerve, was contained within a distinct firm cyst, have led me to this change of opinion.

Mr Lawrence states that he had seen children with the appearances of fungus hæmatodes in the first stage, namely, the altered colour of the pupil, the metal-like reflection in the bottom of the eye, and so on. The uniformly unfavourable result of extirpation deterred him from proposing the operation. Yet, in some instances, very contrary to his expectation, the case has remained for

some time in the state just now mentioned, and afterwards the eye has shrunk and become atrophic.[13]

Mr Travers, also, has published some important observations on the difficulties attending the diagnosis of fungus hæmatodes. He is of opinion that the tapetum-like appearance at the bottom of the eye, in the early stage, cannot be relied on as diagnostic. He mentions that he had seen several cases, in which this appearance was stationary for a time, after which the eyeball dwindled, so that they might fairly be presumed not to have been instances of malignant disease. It so happened, however, that long-continued alterative courses of mercury, or protracted salivations had been used in these cases, so that the fact of their disappearance was consequently open to another explanation, namely, that they were examples of malignant disease which had been arrested by this treatment. That the appearance in these cases was very analogous to that of medullary tumour, we may readily admit from the fact, that in one of them, Mr Travers being about to extirpate the eye, the operation was over-ruled, only by one dissentient voice, at a consultation, including some eminent members of the profession. Several years before Mr Travers published this statement of her case, the patient had recovered with the loss of sight, and still continued in perfect health.

It accords exactly with my own experience, that inflammation of the internal structures of the eye, arising in consequence of an injury, not unfrequently terminates in a deposite, apparently of lymph, which in all probability undergoes vascular organization, and which certainly presents an appearance, deep in the eye, closely resembling incipient medullary tumour. The first case of this kind which fell under my observation occurred in 1815, the inflammation being the consequence of a blow, on the eye of a child, with a snow-ball. In some of the cases in question, I have observed that the ciliary edge of the iris appears wrinkled, the larger circle is drawn somewhat backwards, while the smaller circle projects forwards, and is broader than usual; the pupil is in a middle state of dilatation, and its edge is fringed with uvea; the surface of the deposition or tumour at the bottom of the eye is of a pale tint, and not so defined as in the malignant cases. Points of suppuration form through the sclerotica and conjunctiva, most frequently below the lower edge of the cornea. After bursting, a fleshy fungus projects, then shrinks; and the eyeball becomes atrophic.

Mr Travers states that in a young lady's eye, the fawn-coloured resplendent surface, with red vessels branching over it, was so strongly marked, that he should certainly have considered it to be the nascent malignant disease, but for the circumstance of its having followed a wound with a pair of fine scissors, a fortnight before. The instrument had passed obliquely between the margin of the iris and the ciliary body. Deep-seated inflammation ensued, and blindness, after three days, became complete. The lens remained transparent for months, so as to permit the appearances described to be

observed. At length, a cataract, with constricted pupil, ensued upon the chronic inflammation of the iris; and the eyeball, which had never enlarged, gradually shrunk.

From what I have observed of non-malignant growths within the eye, I am disposed to conclude that appearances resembling those of medullary fungus, may always be regarded as doubtful when they arise from an evident wound or injury, or when they follow or are combined with scrofulous affections of other organs.

Mr Travers remarks that either hydrophthalmic enlargement, or, on the contrary, shrinking by interstitial absorption of the contents of the eyeball, is a sure indication that the disease is not malignant.[14]

Case 264.—Agnes Campbell, aged 12, was admitted at the Glasgow Eye Infirmary, on the 26th December 1833. Six days before which date, a quantity of a mixture of sulphuric acid and water, with particles of broken glass, had been projected against the left eye. There was an irregular cicatrice towards the inner angle of the eye, about two lines and a half from the margin of the cornea, which looked as if it had been produced by a fragment of the glass. No roughness could be felt on examination with the probe, nor any breach of continuity of the sclerotica. She was unable to discern any object with the injured eye, which retained merely a faint perception of light. The pupil was in a middle state of dilatation, but contracted momentarily on sudden exposure of the sound eye to light, and then speedily returned to its former state. The conjunctiva was red. The iris was wrinkled towards its ciliary edge, and had assumed a reddish tinge. The pain was very trifling. Leeches were applied, and calomel, with opium, was ordered.

For some time the inflammation increased, and then diminished. By and by, the bottom of the eye presented a glaucomatous appearance. On the 13th January 1834, the eyeball was found to be shrunk, and disfigured in form by the action of the recti; the pupil presented a greenish yellow hue; and there was an appearance as if the retina was pushed forward, from the side on which the eye had been wounded. At last, a bright reflection from the bottom of the eye, of a whitish-red colour, was evident, very similar to what occurs in incipient medullary fungus, while a grayish-white matter was seen to be deposited a little behind the iris toward the nasal side of the eye. The eye continued to shrink; notwithstanding which, the patient still retained the power of perceiving light and shadow with it. In the course of some months, the lens became opaque.

Case 265.—Charles Kelly, aged 11, was admitted at the Glasgow Eye Infirmary, on the 27th September 1832. The right conjunctiva and sclerotica were injected with red blood; the cornea was somewhat hazy; the pupil was dilated and fixed; the colour of the iris had changed from bluish gray to yellowish brown, several spots near the external circumference of the iris were of a blood-red colour; the anterior chamber was enlarged, and the iris turned back; vision appeared to be extinct. On examining the bottom of the eye, a tawny appearance presented itself, exactly similar to that which attends the incipient stage of medullary fungus.

Eight months before applying at the Eye Infirmary, he had had a fever after which his mother observed that he could not read long at a time, and she thought he had a weakness and giddiness in his head. He had also been troubled with frequent vomiting. The diseased appearances in his eye, however, had been noticed only 10 days before coming to the infirmary, four days previously to which he had been exposed to a storm of thunder and lightning. This had terrified him much, and he was immediately afterwards attacked with pain in the right side of his head.

Neither Dr Rainy, Mr Nimmo, nor myself felt any hesitation in pronouncing this to be a case of medullary fungus. We recommended extirpation of the eye, but to this the mother would not consent. Calomel, with opium, was administered.

On the 29th September, the eye appeared less irritable and he had rested better; but the tawny reflection from the bottom of the eye was more distinct.

On the 10th November, the vascularity of the conjunctiva appeared to have increased, the eyeball was enlarged, and presented a considerable prominence towards the inner canthus; the anterior chamber was diminished in size by the iris bulging forward, while the lens was seen projecting through the pupil, so as to touch the cornea.

On the 21st, the ball of the eye was so much increased in size, that the lids could not be brought together. The prominence above mentioned was now more pointed, and the cornea seemed falling into a state of ulceration.

By the 31st December, the prominent point on the nasal side of the eye had given way, and discharged a quantity of thick purulent matter. The cornea had become opaque, and was much reduced in size. Before this time, a scrofulous enlargement of the left ring-finger was observed.

By the 1st June 1833, the eye had shrunk so much, as to allow the lids to close over it. The pus discharged had been considerable, but was now diminishing. The remaining part of the globe presented a granular appearance, of a reddish-brown colour.

By the 7th April 1834, the lids were very much collapsed, from the extremely atrophic state of the eyeball. The finger had burst, and discharged curdy pus. On introducing a probe, caries was detected.

Case 266.—A boy, about 10, came under Mr Lawrence's care at St Bartholomew's Hospital, in consequence of a wound in the eye, three or four days previously. The point of a table-fork, which had been thrown at him by his sister, had passed through the upper eyelid and the cornea. The eye was inflamed and painful, and the pupil was occupied by a thin grayish film, which Mr Lawrence supposed, on the first cursory inspection, to be opacity of the lens, caused by the accident. The use of leeches and other antiphlogistic measures, lessened the inflammation and removed the opacity from the pupil. The inflammation however recurred, and soon after a bright yellow appearance was seen, which gradually extended over the whole fundus of the globe. The iris was changed in colour; the pupil was fixed in the middle state and clear; vision extinct. In a short time, the globe felt soft, and began to shrink; atrophy was considerably advanced, when the lens became opaque, and completely concealed the change in the back of the eye; the globe became completely atrophic.[15]

Pathological Anatomy. It is to be hoped, that attention being once roused to the fact, that there are various disordered states of the interior of the eye, which simulate, so to speak, the disease called fungus hæmatodes, a more accurate examination will be instituted into their nature, by those who may have opportunities of dissecting eyes so affected, either after extirpation, or after the death of the patient.

It is probable that in some cases, an effusion of blood, lymph, or pus, into the vitreous cells, or on the surface of the retina, will be found to be the whole cause of the appearances, especially when these have quickly succeeded to injuries of the eye; while, in other instances, scrofulous or other tubercles will be found growing from the optic nerve, imbedded in the choroid, or adherent to some of the other textures. In such cases, the optic nerve, beyond the eye, will probably be found healthy or shrunk, whereas in fungus hæmatodes it is generally thickened and diseased.

Mr Travers extirpated the eye of an infant, eight months old, the disease being supposed to be malignant fungus in its nascent state. Upon making a section of the eye, the cells of the vitreous humour were found to be filled with an opaque lardaceous substance. The child grew up to be a healthy boy, and the other eye remained sound. It is evident that an opaque lardaceous substance, or one

esembling curd, or ground rice boiled, all of which comparisons re made use of by Mr Travers[16] in speaking of the contents of the itreous cells, denotes a morbid state altogether different from that hich exists in fungus hæmatodes.

The following case was published[17] as one of fungus hæmatodes, ut the dissection discloses morbid appearances quite distinct from hose which exist in genuine examples of that disease. They approach evidently to what Mr Travers had met with, in the case ast now referred to.

Case 267.—A boy, under the care of Mr Wardrop, two years and eight onths old, became dropsical, and died after having been twice tapped.

It had been remarked, some weeks previous to his decease, that there was a eculiar appearance in the left eye; the bottom of the vitreous chamber having metallic lustre, produced by a yellowish opaque body.

On dissection, a sac was found, adhering to the peritonæum, and containing a rge quantity of puriform fluid, mixed with serum. The sac was formed by the paration and thickening of the two laminæ of the great omentum. There was nother similar cyst formed between the two laminæ of the lesser omentum, and ntaining about a pint of a similar fluid.

The optic nerve of the affected eye was perfectly similar to that of the opposite le, from the thalamus till it entered the globe. The consistence or density of e sclerotica was not perceptibly altered. The choroid coat appeared rather der than natural, and being lacerated at one point, during the dissection, a antity of a creamy fluid escaped. On turning back the choroid, the vitreous amber appeared filled with an opaque white mass, on the anterior part of which y the crystalline lens. By immersion in spirits, the retina was rendered more paque than the new production, and was found of its natural appearance, and veloping the diseased growth. The hyaloid membrane also surrounded the mour, and had become opaque in a few points where the diseased production as found firmly adherent to it. This presented a mass consisting of granules, lobules, united by fine reticulated membrane. It seemed to have commenced the point where the optic nerve pierces the sclerotic, at least it was connected that point by a small pedicle, which was continuous with the larger mass ttached to the hyaloid membrane, the structure of the whole being perfectly entical; viz. small granules, about the size of a millet seed, connected together reticulated membrane.

Although the following case is related by no less an authority an Professor Panizza, as one of medullary fungus, I think the eader will grant, that the appearances on dissection vindicate me placing it along with the anomalous cases, recorded by Mr Travers and Mr Wardrop. The colour, consistence, and relations of e diseased mass, are widely different from what has been observed fungus hæmatodes.

Case 268.—The patient was a lively, healthy child, aged 20 months, affected ith what was considered to be malignant or medullary fungus, originating in vere internal ophthalmia, consequent to painful dentition. The appearances atibuted to fungus had been observed for a month. The diseased eye was of the me size as the other, perfectly moveable, and not inflamed; the pupil was wide- dilated, and immovable. Behind the pupil and apparently in the bottom of e eye, was a spot of a pale yellow colour, divided by furrows into three tuberlar-like eminences. In the furrows, a red vessel was seen ramifying. The spot as better seen, and appeared nearer to the pupil, by looking down into the e than upwards. When it was looked at in the direction of the eye's axis, it emed more distant, or at the bottom of the eye. Vision was entirely lost.

Donagana extirpated the eye, on the 10th December 1822, six weeks after the mmencement of the complaint. In 1826, when Panizza published the case, ere was no re-appearance of the disease.

The extirpated eye was natural in size and form, but its consistence was somewhat firmer than common. The optic nerve seemed quite healthy. The canary-coloured spot was seen through the cornea. On removing the cornea, the aqueous humour was discharged. The iris was healthy. By tearing it away from the orbiculus ciliaris, the crystalline was exposed, perfectly transparent, and enclosed within its capsule. Looking through the lens, the spot to all appearance lay at the bottom of the eye; but on opening the capsule, and removing the lens, it was seen to be close to the posterior capsule. Its apparent distance, then, when viewed through the crystalline was an optical illusion. By removing a line's breadth of the choroid, which, as well as the ciliary processes, was natural, a yellowish soft fungous substance was exposed, apparently containing a fluid. At its upper part, there was a triangular area, where the hyaloid was healthy and the vitreous humour limpid. On puncturing the hyaloid, and giving exit to a small quantity of vitreous fluid, one of the three yellowish prominences suddenly rose, as if it had been compressed, and took the place which had been occupied by the vitreous humour just discharged. Panizza concluded from this, that the vitreous body had become atrophied by the growth of the tumour.

The tumour was soft, elastic, and where it was marked by the furrows already mentioned, its prominences could be separated a little with the probe. Desirous of discovering more completely the relations of the tumour, which seemed to be the retina in a fungous state, Panizza removed a portion of the sclerotica towards the back of the eye, and was proceeding to cut through the choroid, when there suddenly issued a fluid of a canary colour, and the three tubercular eminences immediately sank down a little. The fluid which escaped coagulated by coming in contact with alcohol. To prevent the remainder from escaping, the eye was put into alcohol. The fluid which had escaped was glutinous, and of a salt taste; it lost much of its yellowish colour on being suddenly coagulated by the alcohol into a homogeneous consistent mass. The eye being left in a cup filled with alcohol till next day, was found adhering to the bottom of the cup by means of some of the fluid which had coagulated.

Continuing the dissection, Panizza removed the posterior part of the sclerotica and choroid, which were healthy, and exposed the interior of the eye, filled with the straw-coloured substance. This substance was granular, and when taken between the fingers, it became reduced to a fine powder. As there was no appearance of the retina beneath the choroid, it seemed probable that the tumour was the product of a fungous degeneration of the retina, more especially as the tumour was continuous with the optic nerve at its entrance into the eye. The nerve, also, had the same colour with the tumour. The tumour was somewhat uneven on the surface, but every where presented a consistent granular substance, which on analysis was found entirely albuminous.

Panizza next observed that the optic nerve, gradually expanding, seemed to pass into the tumour. Cautiously removing the soft granular substance, he found, to his surprise, the retina reduced to a conical form, shrunk, and folded together in the middle of the tumour. It extended from the entrance of the optic nerve to the eminences already noticed, which were in fact protuberances of the retina, produced by the push of the yellowish fluid enclosed behind it. Hence it appeared that the tumour did not consist in a fungus of the retina, but was the effect of the yellowish fluid gradually accumulating between the choroid and the retina, and causing the latter to close towards the centre of the eye. The vitreous humour, in proportion as the morbid deposition increased, must have necessarily disappeared, and accordingly only a small portion of vitreous humour was present. Knowing from anatomy with what firmness the anterior termination of the retina adheres to the great circumference of the corpus ciliare, it was easy to understand how the fluid, collected between the choroid and the retina, could not make its way into the posterior chamber, and hence into the anterior. It was evident, also, why the retina, pressed on all sides by the fluid accumulating between it and the choroid, was forced to separate from the choroid, and folding itself together and gathering itself towards the centre of the eye, should compress the hyaloid, and diminish gradually the secretion of vitreous humour. The same fluid also forced the retina to protrude anteriorly in the form of three roundish eminences, with furrows between them. It was equally clear, how the morbid secretion, had

increased much more, would have forced the retina into contact with the lens, would have pressed the lens against the iris, and this against the cornea, irritating all these parts, and rendering them dim, and atrophic.[18]

Non-malignant tumours may not only assume a formidable appearance, and destroy the organ, but from their size and dangerous effects, render necessary the extirpation of the eye.

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[1] Travers' Synopsis of the Diseases of the Eye; p. 416; London, 1820.
[2] Cours complet des Maladies des Yeux; p. 206; Paris, 1820.
[3] Jährliche Beiträge zur Vervollkommnung der Augenheilkunst; Vol. i. p. 37; Pl. i. Fig. 5; Leipzig, 1827.
[4] Treatise on some Practical Points relating to the Diseases of the Eye, by L. C. Saunders; p. 119; London, 1811.
[5] Treatise on the Diseases of the Eye, by W. Lawrence; p. 593; London, 1833.
[6] Traité des Maladies de l'Œil; p. 456; Troyes, 1711.
[7] Op. Cit. p. 591.
[8] Op. Cit. p. 117.
[9] Canstatt über Markschwamm des Auges und amaurotisches Katzenauge; p. 8; Würzburg, 1831.
[10] Handbuch der theoretischen und practischen Augenheilkunde, von Anton Rosas; Vol. ii. p. 617; Wien, 1830.
[11] Edinburgh Medical and Surgical Journal; Vol. xix. p. 51; Edinburgh, 1823.
[12] Dublin Journal of Medical Science; Vol. ix. p. 263; Dublin, 1836.
[13] Lectures in the Lancet; Vol. x. p. 518; London, 1826.
[14] Observations on the Local Diseases termed Malignant, by Benjamin Travers; Medico-Chirurgical Transactions; Vol. xv. p. 235; London, 1829.
[15] Op. Cit. p. 617.
[16] Op. Cit. pp. 202, 400; Pl. iii. fig. 7.
[17] Lancet; Vol. xi. p. 87; London, 1827.
[18] Sul Fungo Midollare dell' Occhio Appendice di Bartolomeo Panizza, p. 9; Pl. i. fig. 1, 3, 4, 5, 6; Pavia, 1826.

SECTION V.—MALIGNANT AFFECTIONS OF THE EYEBALL.

The eyeball is subject to at least three malignant affections; namely, *scirrhus*, *medullary fungus*, and *melanosis*.

Leaving out of view, for the present, the last of these, I am led, from what I have seen of the other two malignant diseases of the eye, to say, that the first is slow in its progress, never ends in any tumour of a very large size, and, upon extirpation, so far from presenting any thing like a fungus, or like medullary substance, is found extremely firm, and of such a fibrous or striated texture, as to merit the name of scirrhus. This degeneration of the eye I have never met with except in persons advanced in life, and more frequently in women than in men.

In the second of the three diseases above enumerated, the tumour, after bursting through the fore-part of the eye, advances with great rapidity, and often reaches an enormous size; it presents a spongoid, or fungous texture, becomes attended at last by frightful hæmorrhagy, and is found on dissection, to consist of a brownish-white

substance, almost entirely destitute of fibres, and which may be compared, in point of consistency and general appearance, to brain. This kind of tumour I have met with both in children and in adults, but much more frequently in the former.

Extirpation of the eye is sometimes attended with complete success in the first set of cases, although even in these there is a danger of scirrhus afterwards attacking the eyelids, the cellular substance of the orbit, or the muscles of the eyeball. In the numerous cases of the second kind in children, which have come under my observation, the operation of extirpation has never been attended by permanent success; a fatal reproduction of fungous excrescence from the optic nerve, has invariably followed in such subjects, and generally within the period of a few months.

SECTION VI.—SCIRRHUS OF THE EYEBALL.

Scirrhus of the eyeball is always preceded by long-continued inflammation in the eye, originating in many cases from cold, supervening in females about the time of life when menstruation ceases, attended by racking pain in the eye and head, and soon followed by dimness of sight, and at length by total blindness. To these symptoms we find that there has succeeded a deformed and indurated state of the eye, the cornea having become opaque, misshapen, and shrunk, the sclerotica of a dirty-yellow colour, and irregularly prominent, the external blood-vessels varicose, and the conjunctiva sometimes thickened, or even tuberculated. The eye is affected with sensations of itchiness, burning heat, and lancinating pain, overflows with tears on the least exposure, and is unable to bear the slightest touch. Severe hemicrania, aggravated during the night, totally prevents sleep, deprives the patient of all desire for food, and renders him unfit for any continued employment of body or mind. One of the most remarkable characteristics of this disease is the length of time during which it may continue without affecting the neighbouring parts, or advancing to ulceration. At last, however, the eyelids and cellular membrane of the orbit are involved in the carcinomatous inflammation; the lids become swoln, red, and indurated, the eyeball is no longer capable of motion, the lymphatic glands of the face and neck become enlarged and painful, the conjunctiva begins to ulcerate, and discharges a thin acrid matter, the ulcer spreads and grows deep, one part after another is destroyed as in cancer of the eyelids, till the patient is gradually worn out by fever, pain, and anxiety.

If the eye is extirpated before the disease is allowed to proceed to such a length, the sclerotica, especially near the optic nerve, is found greatly thickened, hard, almost cartilaginous, and, on being divided with the knife, presents the whitish bands, which are deemed

diagnostic of scirrhus; the muscles of the eye are similarly affected; the eyeball itself is misshapen, in some cases shrunk, in others enlarged; its natural contents are absorbed, or if any of them remain, they are with difficulty recognised; while a whitish or yellowish substance, of less firm consistence than the sclerotica, but, like it, divided by membranous septa, occupies the place of the vitreous humour.

Prognosis and treatment. Neither any internal medicine, nor external application appears to have the slightest power to arrest the progress of this disease. Its nature is intractable; but from the slowness of its course, many years may elapse before it proves fatal.

In the early stage, that is to say, so long as the disease appears to be confined to the globe of the eye, and this remains moveable in the orbit, extirpation ought to be had recourse to, and may be urged as a means likely to be successful. If the conjunctiva, eyelids, or orbital cellular membrane be in any degree affected, removal of the parts cannot be so confidently recommended, on account of the liability of the disease to return. Still the operation ought to be adopted, unless we have reason, from the completely fixed state of the eyeball, strongly to suspect that its muscles, the whole cellular membrane of the orbit, and perhaps even the periosteum, are involved in the scirrhous degeneration.

Should the patient refuse to submit to extirpation of the eye, or should it appear to the surgeon, either from the state of the general health, or the advanced stage of the local affection, that it would be improper to propose an operation, palliatives must be used to mitigate the pain, and lessen the constitutional disturbance. Much may be done in this way by careful attention to the state of the bowels, the observance of a mild and nourishing diet, and the avoidance of whatever fatigues the body, or irritates the mind. Narcotics are to be had recourse to, first of all externally, as in fomentation and the like; and should such applications fail, opium may be administered in clyster, or by the mouth. In advanced cases of ulcerated cancer of the eye, large doses of the preparations of opium are absolutely necessary, to relieve the sufferings of the patient.

SECTION VII.—SPONGOID OR MEDULLARY TUMOUR OF THE EYEBALL.

The disease described by Professor Burns,[1] under the appellation of *spongoid inflammation*, afterwards by Mr Hey,[2] under that of *fungus hæmatodes*, and which has been known also by the names of *soft cancer*, *medullary sarcoma*,[3] *and encephaloid tumour*, not unfrequently attacks the eyeball. A case of this kind was dissected[4] by Paw, in 1597. The tumour of the eye was as large as two fists, and was attended by another tumour on the side of the head. The

substance of the tumours, Paw compares to brain. A case of this disease, in which the eye was extirpated by Mr Hunter, was published in 1767.[5] Mr Hey also expressed his opinion, that fungus hæmatodes not unfrequently affected the globe of the eye, causing an enlargement of it, with destruction of its internal structure; and that if the eye were not extirpated, the sclerotica burst, a bloody sanious matter was discharged, and the patient sunk under the complaint.[6] Mr Wardrop, however, was the first to prove[7] by numerous cases and dissections, that in this opinion Mr Hey was perfectly correct.

Symptoms. Medullary tumour, or fungus hæmatodes, arising within the eyeball, presents three stages. In the *first*, or incipient stage, the exterior form of the eye is unchanged, and the disease is perceived through the cornea and pupil. In the *second* stage, the form of the eye is altered, the organ is enlarged, and its tunics are ready to give way. In the *third*, or fungous stage, the eye has burst, and the tumour protrudes.

1*st Stage.* The iris has lost its natural colour, the pupil is somewhat irregular, slightly dilated, and immovable, and behind it, deeply seated in that part of the eye naturally occupied by the vitreous humour, a whitish or reddish-yellow appearance is observed, particularly when the eye is looked at from one side and at some distance, and when the patient turns it in certain directions. The light, especially when not strong, is peculiarly reflected from the bottom, or from one side of the eye, where the retina is, or ought to be, so that there is some resemblance between the eye in this state, and that of a cat or a sheep, in which the light is reflected from the shining tapetum of the choroid. The appearance in question is sometimes best seen in candle light, and is always rendered more evident by artificially dilating the pupil. By and by, it is evident, that this appearance, now become bright like the reflection from the surface of a brass plate, and so remarkable as to attract the notice of the most casual observer, arises from the presence of a new substance at the bottom of the eye. Slowly, in the course of months, or of years, this body is observed to be advancing towards the pupil, (*Fig.* 68.) which, in general, is now widely and irregularly expanded. At this point of its progress it has sometimes been mistaken for cataract. Attempts have been made to couch it.[8] The surface of the tumour, sometimes of a pretty deep orange hue, in other cases of a white pearl colour, is seen to be more or less irregular, sometimes divided into two or three distinct masses, and partially covered with the ramifications of the central artery of the retina. As it advances, the tumour presses the vitreous humour and crystalline lens before it; the former is absorbed, the latter presses in its turn the iris convexly forward; by and by, the lens becomes opaque, and is generally absorbed. The tumour now touches the iris. Still

Fig. 68.

advancing, it presses the iris into contact with the cornea. The iris loses more its natural colour, and becomes of a grayish or yellowish brown.

When once it begins to shoot forward from the bottom of the eye, the tumour generally proceeds with rapidity. I have known it lie as if dormant, for nearly three years; but in a few weeks after commencing to advance, it not only occupied the whole cavity of the eye, but dilated it to twice its natural size, the first stage hurrying thus into the second.

The first stage is, in general, unattended by pain or external inflammation; but, in some cases, inflammation of the eye, with epiphora, intolerance of light, and headach, is the earliest symptom observable. In other instances, strabismus first attracts notice. The eye is blind from the first. I have known the disease treated for months as an ophthalmia, without its nature being once suspected.

2d Stage. By the end of the first stage, the sclerotica, around the cornea, has probably assumed a leaden colour, and the eye, fixed in the orbit, appears larger than natural, and feels harder to the touch. These symptoms soon become more decided, and are attended, from time to time, by smart attacks of pain, epiphora, and external inflammation. The cornea rapidly expands to perhaps double its natural diameter, and the iris almost disappears. The form of the eye is changed. It grows knobbed at one, or several places, the sclerotica becoming attenuated, and the tumour pressing outwards. Covered by the conjunctiva only, the tumour feels soft, appears white, and looks like a collection of pus, so that by the inexperienced observer, it may be mistaken for an abscess, and opened with the lancet. If the disease is not interfered with, the conjunctiva becomes œdematous, and the eyelids swell. In some cases, the cornea can scarcely be brought into view, on account of the tumour pressing against the sclerotica, either at the temporal or nasal edge of the eye, and turning the cornea in the opposite direction. In other cases, the tumour advances into contact with the cornea, behind and in the substance of which matter is deposited, so that it becomes prominent, opaque, and vascular. It ulcerates and is ready to burst. As the eye enlarges, and undergoes the other changes now mentioned, the patient is subjected to severe fits of pain, chiefly in the forehead and in the neck. They are worse during the night than during the day, penetrate deep into the head, and cause delirium and fever.

3d Stage. When the cornea gives way, a fœtid, bloody, yellowish fluid is discharged, and the patient feels somewhat relieved. The lens also is discharged, unless indeed it has been absorbed. All appearance of an eye is speedily lost. The tumour, protruding through the ruptured cornea or sclerotica, (in the latter case still covered for a while by the inflamed conjunctiva, which it pushes before it,) grows with great rapidity, so that it is no longer capable of being covered by the eyelids, or contained within the orbit. The

eyelids are everted, and the tumour rests upon the cheek. Supplied by a great many blood-vessels, the coats of which are very fine and easily ruptured, it assumes the appearance of a dark-yellow or dark-red fungus, irregular on its surface, soft and spongy to the touch, readily torn, and bleeding profusely on the slightest irritation. Clots of extravasated blood form in the interior of the medullary mass. Extravasations, indeed, of this kind are apt to supplant almost the whole of the medullary matter, so that the name *fungus hæmatodes* becomes more appropriate. The tumour ulcerates by times, and discharges a fœtid sanies, which irritates and excoriates the surrounding integuments. Portions of the tumour die, blacken, and slough off from time to time, but the general bulk of the fungus is not at all reduced. On the contrary, it increases so as to distend the eyelids to an enormous degree, and even to dilate or destroy the orbit, while the portion which projects from that cavity, sometimes exceeds the size of a man's fist.

The veins of the eyelids and forehead become varicose, and, bursting, bleed profusely. The lymphatic glands of the cheek and neck, enlarge, sometimes to a very great extent. In some instances, the opposite eye is protruded from its socket, by the pressure of the tumour.

The patient cannot suffer the lightest covering on the tumour. He becomes affected with great constitutional irritation, restlessness, thirst, frequent vomiting, want of sleep, and disturbance of all the functions of the body; and at length expires, comatose or convulsed, exhausted by loss of blood, and worn out by hectic fever.

The duration of this disease is variable, the history of some cases extending to a few weeks only, while in others it embraces several years. The whole progress is slower in adults than in children. The second and third stages are much more rapid in general than the first. The first is often overlooked, till it suddenly passes into the second.

Pathological anatomy. I have now before me an eye, extirpated by the late Dr Monteath, during the first stage of this disease. Immediately after the operation, I divided the cornea and sclerotica by a crucial incision, and laid back the four flaps. The iris and choroid were entire. I divided them in like manner, laid them back, and along with the choroid, I found that I reflected also the retina, which, though broken, and here and there deficient, is still sufficiently entire to give a white coating to the whole internal surface of the choroid, and has evidently nothing to do in this instance with the medullary tumour, which occupies the whole space of the vitreous humour and crystalline lens, and springs from the optic nerve, by a pedicle. The tumour, enveloped in a delicate membrane similar to the hyaloid, was of the consistence of brain, and of a yellowish-white colour. The optic nerve exterior to the sclerotica, did not appear diseased.

The subject from whom this eye was removed, was a child of about three years of age. In a few months after the operation, the

orbit was filled with a new tumour, and the child soon after died. I carefully examined the parts, and have them now before me. The orbit was occupied by a diseased mass, sprouting from the stump of the optic nerve, and similar in texture to that which had formerly existed within the eye. I opened the cranium, and found the optic nerves, from their origin in the brain to their union, apparently healthy; but from their union to the optic foramen, the nerve of the diseased side was as thick as the middle finger. By passing through the optic foramen, it was constricted as if it had been surrounded by a ligature, but instantly on entering the orbit, it again expanded so as to fill the space between the recti. The tumour, covered by these muscles, filled the orbit so completely, that it still retains the pyramidal form of that cavity.

The appearances on dissection, in cases of fungus hæmatodes of the eye, are very far from being uniform. They may all, however, be referred to the effects of a medullary growth from the optic nerve.

Although the retina was tolerably entire in the case which I have just related, in general it is so completely changed, that no part of it can be detected. In the case before me, the tumour had pressed forward from the end of the optic nerve, within the retina, in such a manner as to produce the complete displacement and absorption of the vitreous humour and crystalline lens; but in some cases the tumour has been known to push itself between the sclerotica and choroid, while in other instances, the fungus has arisen from the optic nerve, before its entrance into the eye, and proved destructive to this organ, by pressure exercised on it from without.[9] It may even happen that there shall be several fungous growths, arising in succession, but latterly going on together, one perhaps behind the sclerotica, another between the sclerotica and choroid, and a third within the sphere of the retina.

The sclerotica appears to suffer less, in general, from this disease than any other part of the eye.

The choroid is sometimes pushed to one side by the tumour, and on dissection, appears like an irregularly shaped bag, containing vitreous humour. In some cases, shreds merely of the choroid can be discovered, dispersed through the morbid growth. In other cases, portions of the choroid are increased to five or six times the natural thickness, and contain medullary-fungous matter. Occasionally no trace of this membrane appears.

Mr Travers tells us that medullary fungus may arise in any of the textures of the eye, with the exception of the crystalline lens and cornea. He had found it between the layers of the sclerotica.

The humours are absorbed in proportion to the pressure of the tumour, and in cases where it has burst through the sclerotica or cornea, they are generally altogether destroyed.

I believe that, on minute examination, it will rarely be found that the optic nerve, exterior to the eye, presents a healthy structure. It will, in general, be found thicker than natural, softer, of a yellowish

colour, and presenting, instead of a bundle of nervous filaments, as it ought to do, a uniform pulpy substance. In some cases, the nerve is found to be split into several pieces, the morbid growth filling up the intervening spaces, surrounding the several portions of the nerve, and forming one connected mass with the contents of the eyeball.

The diseased state of the nerve will in general be found to extend to that portion of it which is contained within the cranium, and in many cases, the brain itself is affected, being changed into a soft pulpy mass, and presenting cavities, either in the substance of the part which has suffered the spongoid degeneration, or around it, filled with blood.

The tumour varies in appearance in different cases, but has always more or less resemblance to the medullary substance of the brain, being in general opaque, whitish, homogeneous, and pulpy. It consists of cellular membrane, brain-like matter, and blood-vessels.[10] Ehrenberg states that medullary tumour presents granules similar to those of the cerebral substance.[11] Like brain, it becomes soft when exposed to the air, mixes readily with cold water, and dissolves in it; while in alcohol or acids, it becomes firm, or even hard. When the softer parts are washed away in water, or when the mass is forcibly compressed, the more solid parts remain, and are found to consist of a filamentous substance, resembling cellular membrane. The consistence of the tumour varies, to a certain extent, in different cases, and in different parts of the same mass, being in some as fluid as cream, in others firmer than the most solid parts of a fresh brain. In some rare instances, gritty particles, probably bony, have been found interspersed through the morbid growth. The colour of the tumour, although commonly that of the medullary substance of the brain, or a very little darker, is sometimes redder, or even of a dark-brown colour, while, in the advanced stage, it often presents portions which nearly resemble clots of blood.

When the absorbent gland lying over the parotid, or any of the absorbent glands of the neck, are enlarged in this disease, they are found to be converted into a substance resembling in every respect, that which composes the tumour of the eyeball and brain. In some cases, the glands ulcerate before death, forming very unhealthy sloughy sores, but most frequently the patient dies before the skin covering the glandular swellings is destroyed. Mr Wardrop mentions, that after the skin covering such contaminated glands had given way, he never observed any fungus to arise from them.

In a case related by Mr Saunders, this disease occurred first in one eye, and six months after, in the other also. I saw it, nearly equally advanced, in both eyes of a child. A similar instance is noticed by Mr Stevenson.[12]

On examining the bodies of those who die of spongoid tumour of the eye, the same disease is sometimes discovered in the viscera of the abdomen or thorax; especially in the liver, kidneys, uterus, or lungs. The brain and the testicle are parts very subject to be attacked by it, and I have found it developed even in the walls of the

heart. The eye is certainly the part of the body most liable to this disease.

Subjects. Medullary fungus is much more frequent in children than in adults. Out of 24 cases which had come to Mr Wardrop's knowledge, 20 of them occurred in subjects under 12 years of age. The greatest number of cases has been observed in children from two to four years old. Sometimes the disease has been met with within a few months after birth. In one case, I saw it in an infant nine weeks old. The mother had observed it six weeks before, so that it probably was congenital. Instances have happened, on the other hand, in which it has attacked adults, or even persons far advanced in life.

The children who fall victims to this disease, are generally of a well-marked scrofulous constitution, or belong to scrofulous families.

Exciting causes. In many of the cases on record, a blow on the eye is mentioned as having preceded, and apparently excited this disease. It may be doubted, however, whether the blindness of the affected eye does not render children more liable to meet with blows on that side, after which, the eye being examined, may be found to present symptoms which had previously existed, but without attracting attention.

Diagnosis. I have already (page 605) had occasion to speak of the difficulties attending the diagnosis in the early stage of medullary tumour. In the fungous stage, it is apt to be confounded with exophthalmia arising from the pressure of enlarged lacrymal gland, or of encysted or other tumours in the orbit, from severe inflammation of the orbital cellular membrane, or even from ophthalmitis. A deep transverse section, from the outer to the inner canthus of the enlarged eye, so as completely to evacuate its contents, is an efficient remedy in simple exophthalmia, that is, protrusion of the eyeball originating from the inflamed state of its own textures. Even a mere puncture of the eye is often sufficient to produce collapse under such circumstances. In the medullary tumour, these proceedings are of no avail; but, as Mr Travers advises, if any doubt of the nature of the case exist, a section of the eye should be practised. In the malignant disease, the globe remains firm, the section being followed only by a small discharge of blood; but if a considerable discharge of discoloured fluid or matter takes place, and the globe collapses, the disease is not malignant, and the cure is complete.

Treatment. Medullary tumour, like cancer, has hitherto resisted the power of all external and internal medicines.[13]

Extirpation of the eye has frequently been performed on account of this disease, but very rarely has it effected a radical cure.[14] In most cases, the disease has certainly been known to return after extirpation of the eye, the optic nerve having probably been diseased previously to the operation, or at all events, giving rise afterwards to a new medullary growth, sufficient to fill the orbit in the course of a few months, or even weeks, so that although the removal of the

eye may have saved the patient from the suffering which always attends the rupture and destruction of that organ, yet it probably hastens rather than retards the fatal termination of the disease. In children, the extirpation of the eye has always failed, when the disease was so far advanced that the posterior chamber was filled by the fungous mass; whether it might be more successful, were it performed when the disease first appears at the bottom of the eye, it is impossible to say. At that early period, the relatives of the patient could scarcely be expected to bring themselves to consent to extirpation of the eye, nor, after the statements of Mr Lawrence and Mr Travers, regarding the uncertainty of the diagnosis, could the surgeon fairly insist on this measure, as being absolutely indicated.

During the inflammatory attacks which attend the progress of medullary tumour within the eye, or in the orbit after the eye has been extirpated, advantage will be derived from the application of leeches to the temple, a spare diet, laxatives, and evaporating lotions. In the advanced stages of the disease, opiates will be required internally; and their external application also gives relief.

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[1] Dissertations on Inflammation; Vol. ii. p. 302; Glasgow, 1800.

[2] Practical Observations in Surgery, p. 233; London, 1803.

[3] Abernethy's Surgical Observations, containing a Classification of Tumours, &c. p. 51; London, 1804.

[4] 'Anno 1597. die 7. April. Præsentibus Chirurgis M. Johanne Simonis et 'Alberto, puerulo trienni aperui caput. Hic aliquot mensibus ingenti laborabat 'tumore ex oculo sinistro, adeo quidem ut integer bulbus ocularis cum musculis 'omnibus foras protuberaret, in tantamque accrevisset molem ut duos pugnos pro- 'tuberantia æquaret. Huic duabus ante mortem septimanis alius tumor ortus 'fuerat prope musculum temporalem sinistrum, quem ablata cute vidimus pecu- 'liari (eaque crassa satis) membrana obductum intra cutem, craniumque hærere. 'Cranium exiguum habebat foraminulum, per quod materiam ejecerat natura. 'Ablato cranio vidimus ocularis tumoris materiam intra cranium et duram matrem 'collectam universam integro planè et illæso cerebro. Aperto utroque tumore 'vidimus eos substantia cerebro planè simili repletos, permixto sanguine concreto, 'haud aliter ac si molæ substantiam vidisses.' Petri Pawii Observationes Anatomicæ; p. 38; Hafniæ, 1656.

Nicolaus Larcheus, in a letter to Marcus Aurelius Severinus, has described and figured a fatal case of what appears to have been fungus hæmatodes, in a child of five years of age. He describes the tumour as originating under the eye. See Severinus de Recondita Abscessuum Natura, p. 150; Francofurti ad Mœnum, 1643.

[5] Case of Diseased Eye, by Mr Hayes; Read August 26th, 1765; Medical Observations and Inquiries; Vol. iii. p. 120; London, 1767.

[6] Op. Cit. p. 283.

[7] Observations on Fungus Hæmatodes, p. 6; Edinburgh, 1809.

[8] Dr Carron du Villards has had the candour to confess his having fallen into this error. See Journal Complémentaire des Sciences Médicales; Tome xliv. p. 6; Paris, 1832.

[9] See Case of Extirpation of the Eyeball, by J. H. Wishart; Edinburgh Medical and Surgical Journal, Vol. xl. p. 274; Edinburgh, 1833. Panizza (Sul Fongo Midollare del Occhio, p. 16. pl. iii. fig. 1; Pavia, 1821.) found, on dissection, in a girl of six years of age, a small tumour surrounding the left optic nerve, within the orbit, the nerve itself being sound, the right nerve fungous, and a large cerebriform mass in the basis of the brain.

[10] Canstatt über Markschwamm des Auges und amaurotisches Katzenauge; p. 15; Würzburg, 1831.

[11] Edinburgh Medical and Surgical Journal; Vol. xlviii. p. 299.
[12] On the Nature, &c. of Amaurosis; p. 37; London, 1821.
[13] Professor Rosas writes me, that he has found mercury useful in arresting the progress of medullary tumour of the eye.
[14] On the propriety of extirpation, see Syme, Edinburgh Medical and Surgical Journal; Vol. xliv. p. 6; Edinburgh, 1835. He is against operating.

SECTION VIII.—MELANOSIS[1] OF THE EYEBALL.

To this morbid growth, Laennec gave the name of *melanosis*, on account of its black colour. Equivocal traces of an acquaintance with it, are to be found in the works of Bonetus, Haller, Morgagni, and others; but the continental pathologists of our own times have been the first to treat of melanosis as a distinct and peculiar affection. In the beginning of the present century, Bayle and Laennec first published upon the subject; but it would appear from a controversy which arose on that occasion, that M. Dupuytren had been acquainted with the disease several years before, and had annually mentioned it in his lectures.[2] Since this period, melanosis has attracted the attention of numerous pathologists, both on the continent and in this country; of whom we may mention particularly M. Breschet, who has inserted a paper on the subject in the first volume of Magendie's Journal, and Mr Fawdington, who has given to the public an interesting case, with general observations on the pathology of the disease, and eight admirable lithographic plates illustrative of its appearances in various organs of the body.

The most striking physical character of melanosis, in whatever region of the body, or under whatever form it occurs, is its dark colour, varying from the hue of Indian ink to a light bistre. In consistence, the product of melanosis bears a considerable resemblance to that which the contents of a decaying lycoperdon, or common puff-ball would present, if rendered cohesive by the addition of a small quantity of liquid. Melanosis displaces or destroys the different textures of the body in a variety of ways. It is most frequently met with in tubercles, or even in considerable masses; is sometimes encysted and connected to the neighbouring parts by pedicles; sometimes diffused through the parenchyma of the viscera; in other cases, deposited upon their surface, or under their investing membrane. It appears that no tissue is free from the invasion of this disease, although it attacks some parts more readily than others. Like fungus hæmatodes, it attacks several organs of the body together, or in succession: the eye, for example, and the liver. In its progress it involves indiscriminately the adjacent textures, supplanting and destroying all that oppose a barrier to its ravages. Even the bones are not exempt from its influence.

M. Breschet has been at some pains to ascertain whether the substance of melanosis is truly organized. With this view, he threw

into the arteries and veins of the contiguous parts, some of the finest and most diffusible injections, without discovering any continuity of vessels between the cyst and the substance it contained, or any organization in the latter.

Dr Rainy, on examining some melanotic substance taken from an eye, which he had extirpated along with the eyelids, observed that a granular matter escaped when the melanotic substance was torn under the microscope, while the solid part presented the appearance of contorted hollow fibres, not unlike some kinds of moss or the villi of the chorion. These fibres were quite different in their aspect from blood-vessels, and seemed filled with granules, not globules. Next day, Dr Rainy examined a portion of another eye, which had been extirpated 18 months before, and found the same sort of fibres. They seem to be distinctive of melanosis.

The composition of the tumours in melanosis has been ascertained, by chemical analysis, to approach very nearly to that of the coagulum of the blood. Thenard and Barruel recognised a large quantity of carbon in melanosis, and to this some have attributed the black colour; but erroneously, for the blackness of melanosis is discharged by the action of chlorine.

Melanosis is undoubtedly of a fungous nature, and being not unfrequently found in conjunction with other kinds of fungous disease, especially the medullary, it has been regarded by Mr Wardrop[3] and others, merely as a variety of fungus hæmatodes. This view is, no doubt, countenanced by the fact, that tumours have been met with, possessing almost every possible degree of intermediate feature, so as to render it difficult to determine whether the character of melanosis or that of medullary fungus prevailed. If, however, we take the extreme states of each disease, we discover, (as Mr Fawdington observes,) differences of a very marked and striking character. In the anatomical structure of melanosis, the paucity or entire want of vessels, constitutes a distinguishing peculiarity; while medullary tumour, which invades the system as extensively, appears under similar forms, attacks the same textures, and eventually produces a like influence on the general economy, is as remarkable for a contrary state, namely, a luxuriant vascularity. Laennec remarked that fungus hæmatodes is in general supplied by a great many blood-vessels, the trunks of which ramify on the exterior of the tumours, or between their lobes only, while the minuter branches penetrate into the substance of the morbid growth; and that the coats of these vessels being very fine, they are readily ruptured, thus giving rise to clots of extravasated blood in the interior of the tumours, sometimes of considerable size. Nothing of this kind is observable in melanosis, no extraordinary development of arterial branches leading to the tumours, none visibly ramifying on the cysts which surround them, none in the morbid substance.

Mr Fawdington has carefully compared the local phenomena presented during life by these two diseases. In fungus hæmatodes, if the tumour be at all advanced, there is pain, constant or occasional,

sharp, and lancinating, and often accompanied by signs of low vascular excitement. In a farther stage, the suffering is increased; an ulcerated breach having been produced in the integuments, the fungus grows and sloughs by turns; it discharges an offensive sanies, and considerable bleeding takes place, which for a time relieves both the vascular and nervous irritation attendant on the progress of the disease. Lastly, the absorbent glands in the vicinity participate in the mischief, and the general powers become exhausted, from the combined influence of pain, irritation, and discharge. In melanosis, unless the growth of the tumour be circumscribed by textures which yield with difficulty, such as the tunics of the eyeball, or the cavity of the orbit, there is neither pain, as a necessary concomitant, nor an excited state of vessels in the circumjacent structures. As to the phenomena of melanosis in the ulcerative stage, there seems to be a blank which must be left to future observers to fill up; but reasoning from its low state of organization, it may be concluded that many of the pathological changes which attend the career of fungus hæmatodes, will not be found to exist in melanosis. The process upon which the softening of this tumour depends, is as inexplicable as the laws of its production and increase; but that it arises from a power inherent in the morbid structure, and distinct from the common conditions of suppurative inflammation in other structures, is to be inferred from the absence of those agents which support the latter, in the situation where the softening is first observed.

Symptoms of melanosis of the eyeball. The cases on record are too few to enable us to say more under this head, than that, in the early stage, the patient complains of imperfect or destroyed vision, with a sense of fulness and pain in and around the eye, followed by enlargement of the eyeball, attenuation of the sclerotica, so that a mass of black substance appears shining through it, and a peculiar opaque appearance of the pupil. The cornea or sclerotica gives way, and a black fungus protrudes, which increases slowly, and in general does not bleed much.

If the tumour which protrudes from the eye be cut off, the part heals, and by and by the melanosis protrudes afresh. This I have witnessed in two cases.

In one of the cases, in which Dr Rainy extirpated the eyeball, at the Glasgow Eye Infirmary, the optic nerve was affected with the melanotic degeneration, but not all the way back to the optic foramen.

Like fungus hæmatodes, melanosis occasionally occurs exterior to the eyeball, in the eyelids, under the conjunctiva, on the surface of the cornea, (see page 238) and in the cellular membrane of the orbit. In the last mentioned situation, the tumour pushes the eye before it, and at last the eye is destroyed by inflammation. (See case 186.)

Cases. In Mr Wardrop's work on Fungus Hæmatodes, and again in Mr Allan Burns' Observations on the Surgical Anatomy of the Head and Neck, the following well-marked case of melanosis of the eye is related merely as a variety of medullary tumour.

Case 269.—Mrs Scott, about 41 years of age, had always been of a delicate habit of body, and sallow complexion. The progressive advancement of the disease of the eye appears to have occupied a period of two years and a half. It first manifested itself, by the patient being unable to see distinctly with her left eye; and on looking at the organ, a milkiness was seen behind the pupil. This opacity, which Mr Burns speaks of as seated in the lens, gradually increased during four months, when the patient became completely blind of that eye. About four months after losing the sight of the eye, it became very much inflamed, without any obvious cause. By bleeding with leeches, &c. the inflammation abated, but the redness and pain never entirely left the eye. From what Mr Burns had been able to learn, the opacity of the lens could not be so decidedly ascertained after this attack, owing to the turbid state of the contents of the anterior chamber.

The further progress of the case was not traced till within six months of the time when Mr Burns thought it necessary to remove the contents of the orbit by operation. At the beginning of that period, a tumour began to protrude from the lower side of the sclerotic coat, just behind the edge of the cornea. Two months after this, Mr Burns found the cornea rather more prominent than usual, but he could distinguish with accuracy neither the iris nor the crystalline lens. The appearance impressed him with the idea, that a fungus was lodged behind the cornea, ready to protrude as soon as the latter should give way. The tumour at the lower part of the sclerotica was now about the size of a musket-ball, and seemed to contain a dark-coloured fluid, the cyst being formed by that part of the conjunctiva which covers the sclerotica, while over the surface of the sac a number of red vessels ran in every direction. The pain was intense and lancinating; sleep was interrupted, and besides being affected with hysteria and pain in the back, the patient was in some degree hectic.

After four months more, matters were in a much worse state, and the patient's health completely broken; she had confirmed hectic fever, and was often attacked with paroxysms of hysteria; she was much reduced and exceedingly weak, and had not been out of bed for two months. The cyst, which formerly had not been larger than a musket-ball, had now attained the size of a pigeon's egg, and formed a solid fungous mass, which could with difficulty be raised, so as to uncover the lower eyelid. The cornea was flat, and was hid beneath the upper eyelid. From the body of the large fungus, two small fungi protruded, and towards the temporal extremity of the lower eyelid, there was a hard tumour, situated under the integuments and adhering firmly to the cheek-bone.

The patient was anxious to have the parts removed by operation, which was accordingly done by Mr Burns, assisted by Mr Wardrop. As the tumour exterior to the eyelids was of considerable size, Mr Burns separated them by an incision at their temporal angle. He then grasped the tumour, and dissected back the eyelids from it. As he wished to take out all the diseased parts in connexion, he endeavoured to detach them from the lower margin of the orbit; but, to his surprise and regret, he found that the bone on which they rested was softened and black in colour. He therefore gave up the attempt, and proceeded to detach the eyeball from its connexions with a common scalpel. While separating it from the roof of the orbit, he was cautious, lest, the bone there being soft, the point of the knife might pass into the brain. By the pressure employed in pulling forward the morbid parts, they burst, and a considerable quantity of inky fluid was poured from the opening. Mr Burns traced the optic nerve to its exit from the skull, and there divided it. Its medullary substance was as black as ink. He next chiseled away as much as he could of the diseased edge of the orbit, but with little hope that the issue of the operation would be favourable. The diseased state of the optic nerve, and the condition of the bone, hardly allowed any reasonable expectation that the patient would ultimately recover. The bleeding from the divided vessels was easily restrained by the pressure of a plug of lint.

As soon as possible after the operation, a section was made of the morbid parts which had been removed. When dividing the eyeball and optic nerve, a great quantity of a thick viscid dark-brown matter, coloured the knife. The eyeball and tumour seemed entirely composed of a similar dark-coloured matter. This singular-looking substance was of the consistence of thick oil-paint, though not

so clammy and oleaginous. It soiled the fingers of a dark brown or amber colour. It readily dissolved in water, and both Mr Burns and Mr Wardrop were struck with its resemblance to the pigmentum nigrum. The cornea appeared sound. The crystalline lens was of an amber colour. The sclerotica, at that part which corresponded to the malar portion of the orbit, was ruptured by the tumour, and the torn edges were separated about a quarter of an inch from one another. The sclerotica was at the same place split into two layers, a small quantity of the dark-coloured substance being interposed between them. No distinct remains could be traced of the iris, but the choroid appeared much more vascular than natural, and at one part was five or six times its usual thickness. At the place where the sclerotica was ruptured, the choroid insensibly terminated in a white pulpy substance, composing part of the diseased mass. The contents of the eyeball were composed chiefly of a medullary-like pulpy substance, variously tinged in different places by the dark-brown colouring matter. The tumour projecting beyond the sclerotic coat, appeared to be composed of a similar structure, and upon maceration, numerous white striæ, and in some places, spots, appeared throughout the substance of the diseased mass. Exterior to the eyeball, the tumour was covered with a thick mucous membrane, except at the two small prominent parts where it had been ulcerated, this covering being probably derived from the conjunctiva, which the tumour in its progress had pushed before it.

The optic nerve was of its natural size, but on examining its section, it was found that the medullary part of it had a black appearance, exactly resembling the tumour in the eyeball, while its neurilema was apparently healthy. No remains of the retina could be detected. One of the lymphatic glands lying by the side of the optic nerve was changed into a dark-coloured substance.

Although much reduced by hectic, and emaciated to a great degree at the time of the operation, the patient soon appeared to recover; she gained flesh and strength, her appetite was restored, the pains in her back and loins left her, she slept well, and was able to walk about. The orbit discharged good pus in moderate quantity, and was at last filled up with a soft substance, which although dark in colour, skinned over.

When she and her friends considered her recovery certain, the weather became cold and damp; the pain about her back soon recurred, she lost her appetite, and was unable to walk from exquisite pains in the loins. She could obtain no sleep, except from opium. The lower eyelid was protruded by an elastic fungus, which also began to project from between the lids. The disease in the orbit gave her no uneasiness, her whole complaint being seated in the back and loins. The pain there was excruciating. She could neither turn in bed, nor permit herself to be turned. In this deplorable condition, she lingered for two or three months; the tumour below the orbit all the while increasing in size, and the pain in the loins in no degree remitting. When Mr Burns saw her, three weeks before her death, she was emaciated to the last degree. The tumour below the orbit was as large as a pullet's egg; its surface unequal, the most prominent parts of it covered with livid integuments, and the swelling conveying to the fingers the impression as if it contained a fluid. From between the eyelids, a very small fungus protruded, covered with a coat of bloody-looking matter. She had little or no pain in either the orbit or the head, and the vision of the other eye remained unimpaired. From this time to her death, she sunk gradually, the tumour going on to enlarge, and becoming more discoloured on its surface, and more irregular, but the fungus between the lids undergoing no change. About twenty-four hours previous to her death, she became suddenly comatose.

On dissection, the liver was found to contain some tumours of a similar texture and appearance with the contents of the eyeball, as ascertained after its extirpation. There was also a cyst in the substance of the liver, filled with a great quantity of grumous-looking purulent matter. Above the kidneys there were similar tumours of pretty considerable size, and the uterus was cartilaginous. The urinary bladder was enormously distended with a turbid, bloody-looking fluid; but otherwise, in so far as this viscus was examined, its structure appeared healthy.

By making a vertical section of the orbit and fungus it contained, the tumour was found to arise entirely from the antrum maxillare, which had burst both above

and in front. The fungus projected also beyond the lower spongy bone and investing membrane of the nose, into the nostril. The tumour proceeding from the antrum was, on its outer surface, studded over with small knobs of a dark livid colour. Internally, this tumour was made up of a soft substance of an ink colour, intersected by membranous slips, intermixed with a grayish substance, and with ragged fragments of bone. The anterior wall of the antrum was destroyed at its upper part, and the floor of the orbit was elevated, so as to have merely the periosteum and a thin layer of fat between it and the orbitary plate of the frontal bone. The fungus was exterior to the orbit, although from the destruction of the periosteum attached to the malar portion of the orbit, it had been allowed to protrude from between the eyelids. This portion of the periosteum was destroyed partly by disease, and partly in consequence of the removal of a carious portion of the bone, when the eye was extirpated.

With regard to the optic nerve, it was expected that its extremity would have been connected with the fungus. Between them, however, the periosteum of the floor of the orbit was interposed. The nerve itself was of its natural size, but of a black colour where it entered the foramen opticum. From this point to near where it had been divided in the extirpation of the eyeball, it was in a similar state; the neurilema had only a slight connexion with the diseased substance of the nerve. At the bottom of the orbit there was considerable matting and induration of the origin of the muscles. At its termination, the nerve formed a sharp point, its coats adhered to the thickened periosteum of the floor of the orbit, which was pressed into contact with it by the fungus from the antrum. The optic nerve within the cranium was as thick as the little finger, and as dark in colour as the part of it contained in the orbit. The junction of the nerves was so much enlarged, that it formed a tumour extending into the third ventricle.

As, from the dark colour of the diseased parts, this was a favourable opportunity for ascertaining whether the optic nerves decussate, or merely unite, the state of these parts was carefully examined. The dark colour was found to extend much beyond the point where the nerves join; but this change of colour was confined to the left side, or to the nerve of the affected eye. On the right side, the nerve was of its natural size and colour, and was attached to the black diseased parts merely by cellular shreds. This dissection, therefore, Mr Burns regarded as proving that the nerves did not, in this individual, cross each other.

Case 270.—In January 1824, Thomas Peckett, aged 30, a robust healthy-looking man, consulted Mr Wilson of Manchester, respecting a violent and incessant pain in his left eye. Six months previously to his application, he had received a blow upon the organ, from the projection of a small piece of iron; but the injury appeared to be of a very trifling nature, as he experienced but little pain, and the eye did not exhibit any external appearance to attract the notice of others. About a fortnight after this accident, he experienced a sensation of fulness in the globe, and upon shutting his right eye, discovered that his sight in the left was very imperfect. The pain and dimness gradually increased, the former to a most distressing degree, affecting chiefly the ball of the eye and margin of the orbit.

The conjunctival vessels were now enlarged and tortuous, and the sclerotica generally inflamed and undergoing absorption, the dark choroid being just visible towards the internal canthus. The iris was immovable, and a slate-coloured opacity occupied the centre of the dilated pupil. No symptoms of cerebral affection were manifested. The treatment had been limited to the occasional application of leeches to the temple.

By drawing blood freely and repeatedly from the temple and nape of the neck, together with blistering, active cathartics, and an abstemious diet, the pain was removed; but no amendment in vision ensued. At this, however, he was not disappointed, as Mr Wilson had given him no reason to hope that his sight would be restored. After remaining in Manchester nearly a month, he was permitted to return into Staffordshire.

Towards the end of March, he again applied on account of a return of pain. He stated, that a few days after he returned home, he had experienced his former sensations, and the pain was now so violent and incessant, as to prevent him from

sleeping. The disease had made considerable progress, and it was to be feared, that the pain was owing to a morbid growth within the eye. The sclerotica, at its upper part and towards the inner canthus, was extremely attenuated; the choroid covering the protruding substance. The opaque appearance in the pupil had assumed a dirty-red colour, resembling newly organized lymph, and this seemed to be the apex of a conical-shaped body, situated deep in the bottom of the eye.

The former treatment, with moderate ptyalism, was ineffectually adopted, and on the 19th of April, Mr Wilson removed the contents of the orbit.

A section of the eyeball discovered, in the situation of the vitreous humour, a black pultaceous tumour, occupying more than one-half of the interior of the globe. There were two cavities or cells filled with a brownish-red fluid, one situated at the side of the tumour, the other anterior to it, and behind the lens. No trace of the vitreous humour or cells could be discovered. The choroid was entire, and could easily be separated from the sclerotica, except at one point towards its superior and internal part, where it ceased to be distinguishable from the general mass of the tumour. The sclerotica was here reduced to an extreme degree of tenuity, and had a split appearance. The retina was quite detached from the choroid by the interposition of the disease, and lay folded across the globe, forming a kind of septum between the black mass and the larger of the two cavities, containing the brownish-red fluid. The lens was opaque and of a yellow hue, the capsule thickened, but partially transparent; a fold of retina covered the posterior capsule. The ciliary ligament was distinct, and some ragged portions of membrane at the margin of the lens, and posterior to the iris, which was imperfect, showed a remnant of the ciliary processes. The optic nerve, where it had been divided at the time of the operation, appeared to be sound.

He recovered from the operation, and returned home at the end of a month, apparently well.

In August he again applied, on account of three or four tumours on the face, about the size of leaden shot, perfectly black, but unattended by uneasiness. He complained of difficulty of breathing and stitches in his side, with a short cough. He had evidently wasted in flesh, and his pulse was quick and remarkably sharp. A tumour similar to those on the face, was discovered on the skin of the back, between the scapulæ. In a few days, one or more were found on the scalp.

His strength rapidly declining, he came under the care of Mr Fawdington, on the 2d October. His general aspect indicated a deficient supply of nutriment, or an imperfect appropriation of it to the purposes of the system. The surface of his body was pale and exsanguineous, and there was a considerable degree of muscular emaciation, with œdema of the legs. But the most striking feature of the case was an exceedingly protuberant abdomen, apparently from enlargement of one of its viscera, and this probably the liver. The face and scalp displayed several perfectly developed melanotic tubercles, and one on the lower lid of the extirpated eye appeared on the verge of ulceration. The bottom of the orbit was free from any visible melanotic deposition. In every other situation, excepting two or three points on the trunk, the cutis had escaped the direct invasion of the disease; but the subcutaneous tissue, over the whole chest and abdomen, was evidently loaded with melanosis, giving rise, where the cysts encroached on the skin, to faint-blue elevations, more or less distinct, and of various sizes; none, however, exceeding the fourth of an inch in diameter.

The patient died on the 3d November, worn out by hectic.

On dissection, the subcutaneous cellular texture on the front of the trunk was found granulated with melanotic tubercles. The liver, enlarged to four times its natural size, was disorganized by the same disease; with which also the peritoneum, pancreas, spleen, kidneys, pleuræ, lungs, and heart, were more or less affected. The brain was not examined.[4]

Case 271.—John Taylor, aged 41, of a dark unhealthy complexion, was admitted at the Glasgow Eye Infirmary, on the 13th May 1834. About nine years before, while in America, the vision of his left eye became dim, and was soon entirely lost. The bulb of the eye, on his admission, was shrunk and knobbed. There were still some traces of cornea, behind which was a white substance, apparently the lens. Adhering to the bulb of the eye, at its nasal margin, there

was a prominent tumour larger than a pea, smooth on the surface, covered by the conjunctiva, and firmly attached to the bulb. Pressure on the tumour occasioned pain. The patient also complained of uneasy feelings in the forehead, especially above the left eyebrow. The left lower eyelid was inverted, and the consequent friction of the eyelashes seemed to excite irritation in the tumour. The right eye was sound.

On the 19th, the inversion of the eyelid having been already cured by operation, a portion of the tumour was removed with the scissors. Its contents were dark-coloured, and of considerable consistence, so that the tumour did not collapse.

On the 23d, a grayish fungus protruded in the situation of the tumour. The patient was advised to have the eye extirpated, but unwilling to submit to the operation, he discontinued his attendance.

He returned on the 5th August, and signified his wish to have the eye removed.

The dark-coloured soft tumour, occupying the nasal half of the left eye, had now attained the size of a large filbert, and was rapidly increasing. Its anterior surface was marked with a stellated scar, the result of the former operation. (*Fig.* 69.) The patient complained of considerable pain of the left side of his head, down to the neck, preventing sleep. His stomach was very irritable.

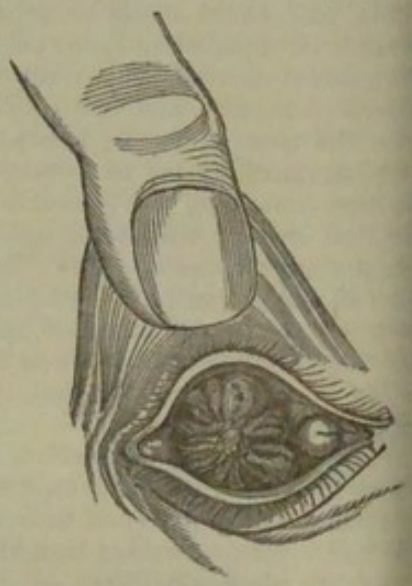

Fig. 69.

On the 7th, I extirpated the eye, after which the lids were covered with a piece of simple dressing and a roller.

On examination, the whole eye was found atrophic. The cornea, as could be seen before the operation, was not more than two Parisian lines in diameter; it was transparent, so that the opaque lens could be seen through it. The optic nerve was much reduced in thickness, indeed nothing but the neurilema of the fibrils seemed to be left, all the medullary matter being absorbed. The tumour, which was about five or six Parisian lines in diameter, protruded through an opening in the sclerotica, on the nasal side of the dwarfish cornea. It was covered externally by aproduction of the conjunctiva.

On making a section of the tumour, it was found to consist of a light bistre-coloured tissue, nearly of the consistence of muscle, which, when torn, indicated a fibrous structure. The section through the tumour having been continued through the eyeball, the latter was found to have undergone extensive disorganization. There were some remains of the choroid and annulus albidus, but a bony lamina occupied the place of the retina; and the neurilema, which was all that remained of the optic nerve, at the place where this joins with the retina, had several earthy deposits in it. The lens was entirely converted into an earthy matter, which affected a laminar arrangement. The capsule was very tough. There was no trace of iris nor posterior chamber. The anterior chamber was very small. All the rest of the interior of the eye was filled by a melanotic mass, of a pappy consistence, from which the tumour appeared to rise. There was, moreover, towards the inner side and back part of the eye, a small mass of a reddish-white matter like brain, and, close by this, a small quantity of a soft dark-red matter. In the interior of the tumour, some dark-red matter was also observed surrounding and isolating a nodule of the bistre-coloured substance from the rest of the mass.

The pappy melanotic matter contained in the interior of the eye, being examined with the microscope, was observed to be composed of black particles of no definite form, interspersed among which were some minute crystals of a rhomboidal shape. The tissue composing the tumour, which as has been said, was somewhat fibrous, on examination with the microscope, was seen to consist of flattened globules, considerably larger than those of the blood, united together in fibres by a delicate cellular tissue. The most of the globules were light coloured, but there were interspersed among them a number of dark-coloured bodies, which

appeared to be globules, containing in their substance black particles. The brain-like and dark-red matters were also composed of globules, but very few black bodies were observed among them.

The patient experienced no uneasiness after the operation, and felt quite relieved of the pain which he complained of before the removal of the eye.

Case 272.—In July 1835, Mr Espie, surgeon at Falkirk, was called to visit James Campbell, aged 40, a labourer in the parish of Larbert. When 10 years of age, the patient lost the use of the left eye from traumatic cataract. Fourteen years before Mr Espie's visit, a swelling formed at the left angle of the lower jaw, suppurated, and burst internally. This suppuration left a pain in and round the right orbit, with dimness of sight in the right eye. These symptoms increased, and after two years the patient consulted the late Dr Monteath, of Glasgow, who considered the vision of the right eye all but gone, and advised no remedy for it, but recommended the removal of the left lens. The patient went to Edinburgh, and repeatedly submitted to the operation of couching, the lens having several times re-ascended. At length, extraction was practised, but the eye inflamed violently, the cornea became opaque, and all hope of restoring the sight was lost. The friends of the patient, about this time, observed the right sclerotica becoming black, and the eyeball enlarged.

Mr Espie found the right eyeball much enlarged, burst, and sending forth a black fungus, which, in several places, had given way, and was discharging considerable quantities of melanotic matter. There appeared to be much determination of blood to the right orbit. The general health was impaired, and the bowels irregular. Mr Espie ordered repeated leeching around the orbit, and a blister behind the ear. The patient found great relief from the local bleeding, and his general health improved under the use of a nourishing diet, and occasional doses of laxative medicine.

Mr Espie saw nothing more of the patient till September 1836, when, being again called to visit him, he found the eyeball still larger than before, with blood oozing from it, and melanotic matter continuing to be occasionally discharged from it. The patient complained of pain in the right side of his head, and darting from the orbit to the hind-head. His general health was again somewhat impaired. The same advice was given as before, and was followed by a similar improvement.

The fungus continuing to enlarge, and the discharges from it to increase, particularly the bleeding, in January 1837, Mr Espie sent the patient to me for advice.

At this period, the tumour, which hung from the eye, through the destroyed cornea, was of the size and shape of a large French plum, flattened; it was no longer within the cover of the eyelids, but lay upon the cheek, and wagged about as the patient moved his eye. It was slightly lobulated, and quite black. Its investing membrane appeared as if abraded, and occasionally gave way and bled. It had a most offensive smell. The patient still complained of pain, and of a feeling of traction in the course of the optic nerve. I had no hesitation in recommending extirpation of the eye, with as much as possible of the optic nerve.

The patient having been seized with influenza, the operation was postponed till the 20th February, when it was performed by Mr Espie.

On examining the parts which were removed, the sclerotica appeared entire, but greatly atrophied, the natural contents of the eyeball completely destroyed, a pretty thick cup-like deposit of bone within the sclerotica at the back part of the eye, the rest of the cavity filled with the melanotic tumour. At one period the optic nerve, on its way to the retina, had passed through a small hole, which was found in the ossific deposit. On making a section of the tumour, it appeared divided by septa. The melanotic matter had an oleaginous appearance, and, with some shades of dark brown was of a deep black colour. The optic nerve was reduced to about one half of its ordinary thickness; it was somewhat softened, but not black.

In 10 days, the patient had perfectly recovered from the operation, and acknowledged that he had not enjoyed such good health for 12 years. In July 1839, he continued well, and the orbit free from disease.

Causes and treatment. As to the remote and exciting causes of melanosis, we are quite in the dark; nor can we say any thing with certainty on the method of cure.

Does extirpation afford any greater hope of permanent benefit, than in cases of fungus hæmatodes? Mr Lawrence[5] thinks it does. "In the early stage of melanosis," says he, "when you can be confident that it has not extended beyond the original seat in the eye, there seems to be a chance of permanent cure by removing the disease." He refers to the case of an Irishman, about 30, from whom he removed an eye affected with melanosis. Between one and two years after the operation, he was perfectly well. In another case, where the disease had existed longer, the patient died ten or twelve days after the operation, and on dissection, the liver was found enormously enlarged, and filled throughout with melanotic depositions.[6]

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[1] *Melanosis*, from μέλας, *black*. Some of the lower animals, and especially the horse, are subject to this disease.

[2] Journal de Médecine de Corvisart; Tomes ix. et x.

[3] Observations on Diseased Structures, prefixed to the second volume of Baillie's Works, p. liii; London, 1825.

[4] Case of Melanosis, by Thomas Fawdington; London, 1826.

[5] Lectures on Surgery, London Medical Gazette, Vol. vi. p. 39]; London, 1830.

[6] Consult, for other cases of melanosis of the eye, Transactions of the Medico-Chirurgical Society of Edinburgh, Vol. i. pp. 272, 274; Edinburgh, 1824. Gräfe und Walther's Journal der Chirurgie und Augenheilkunde, Vol. xii. p. 662; Berlin, 1828. London Medical Gazette, Vol. vi. p. 224; London, 1830. Pruscha de Melanosi Bulbi Oculi, pp. 33, 37; Viennæ, 1831.

CHAPTER XVI.

EXTIRPATION OF THE EYEBALL.

1. When we are about to extirpate the eyeball, it is better to lay the patient on his back, with his head raised on a pillow, than to keep him in a sitting position. If he be a child, after wrapping him in a folded sheet, which is to be pinned tight about him, he may be laid across the knees of one of the assistants, who is to hold him by the elbows and trunk, while another assistant, with his knees, fixes the child's head.

2. When the eyeball is not enlarged, and is the only part to be removed, the extirpation may be accomplished without any previous disunion of the lids from each other at their temporal angle. But

if, on the contrary, there is any considerable enlargement of the eyeball, or if the muscles of the eye, or the whole contents of the orbit are to be dissected out, it is absolutely necessary first to disunite the lids, by means of an incision carried outwards from their external angle, towards the temple. Even when the eye is small, such disunion of the lids enables the operator to accomplish the extirpation of the eye with much greater facility. Nor ought it to leave any additional deformity, for the edges of the incision, being brought together immediately after the operation is finished, generally adhere by the first intention. Care must be taken in making this separation of the lids, not to limit the incision to the skin but to go through the fibrous layer of the lids and the conjunctiva, so that the eyeball may be easily and fully exposed.

3. The operator now passes a large curved needle, armed with a strong linen thread, doubled and waxed, through the eyeball, from its temporal to its nasal side, avoiding the cornea, and any part which appears to be so disorganized that it would give way under traction by the ligature. The needle is then cut away, and the ends of the thread knotted together. By means of the thread, the eye can be carried in any particular direction during the remaining steps of the operation. Some prefer a large sharp hook for the same purpose.

4. The assistant now raising the upper lid, and the eye being carried upwards and outwards by means of the ligature, the operator plunges a double-edged scalpel directly backwards into the orbit, between the eyeball and the internal canthus, and then sweeping the instrument round, he separates the eyeball from the lower eyelid, by a division of the conjunctiva. Next, moving the eye inwards and downwards, the connexion of the upper part of the conjunctiva is disunited, the scalpel passing round the eyeball to the inner canthus. In this part of the operation, care should be taken to leave as much of the healthy conjunctiva attached to the lids as possible, especially if it is contemplated that the patient should wear an artificial eye. The cellular connexions of the muscles of the eyeball with the walls of the orbit are next to be divided, and the inferior oblique muscle cut across, bearing carefully in mind the directions of the sides of the orbit, and the thinness of its roof. If the eye be dragged forward, it may be dissected out, leaving the muscles behind, a procedure which, in some cases, may be sufficient. In other cases, the muscles must be removed. The optic nerve at last forms the only remaining connexion which prevents the complete extraction of the eye. Dragging the eye forward by means of the ligature, the nerve, thus put on the stretch, is to be divided with the scalpel, or the strong curved scissors recommended for this purpose by Louis, and commonly called Louis' scissors. The nerve ought to be cut as close to the optic foramen as possible.

5. As soon as the bleeding from the branches of the ophthalmic artery has ceased, the operator examines the orbit with his index-finger, in order to discover whether any of the diseased substance

be left behind. If there is any such, it must be dissected out. The lacrymal gland also, if diseased, is to be laid hold of with a pair of forceps, and removed with the scissors. Indeed, in cases of scirrhus, fungus hæmatodes, or melanosis, the whole soft parts should be removed, leaving only the periorbita. The muscles are very liable to be affected in cases of scirrhus; if they be so affected, any portion of them which is left in the orbit, may give rise to a fatal renewal of the disease.

6. It was formerly the practice, after the extirpation was finished, to stuff the orbit with lint, rolled up into a ball, and surrounded by a thread, which was left hanging from between the eyelids. This is now generally laid aside, being likely to excite inflammation, which might extend to the dura mater. The lids are merely brought together, and covered with a piece of spread lint, a light compress, and a roller. It cannot be denied, however, that such a procedure favours union between the lids and the cellular membrane left in the orbit, and may thereby impede or entirely prevent the application of an artificial eye after recovery from the operation. If the lids have been disunited by an incision carried from their outer angle towards the temple, the edges of the wound are to be brought into contact, and kept so by a stitch or two.

7. As for the hæmorrhagy which occurs during or after extirpation of the eye, the free exposure of the bleeding vessels to the air for a few seconds, or the injection of cold water into the orbit, is in general sufficient to produce their contraction. We are of course provided, however, with the tenaculum, and ought to tie any considerable vessel within reach, which may continue to bleed. If bleeding goes on to any great extent from the deep part of the orbit, pressure must be had recourse to. Sometimes the mere pressure of the finger for a few minutes is sufficient, but in other cases, it is necessary to introduce to the bottom of the orbit, a conical roll of lint, pressing it against the bleeding orifice of the ophthalmic artery for some minutes, and then removing it. Should the hæmorrhage still continue, the orbit must be stuffed with lint, against which the lids being compressed by a bandage going round the head, the bleeding is completely checked. The lint may be left in the orbit for two or three days.

8. It occasionally happens that the disease of the eyeball has propagated itself to the eyelids, and that they are either adherent to the eyeball, present a number of irregular prominences and fungosities, or have become affected with ulceration. In such circumstances, it may be judged necessary to remove the eyelids as well as the eyeball. In this case, the best plan is to divide the lids round their base, including all the diseased parts, then by the incision thus formed pass a ligature through the eyeball, and proceed to extirpate the eyelids and eyeball together.

9. The patient must be kept quiet, fed on spoon-diet, and his bowels carefully attended to. In general, little or no fever, and no bad effects of any kind follow the operation. The clotted blood

which fills the orbit dissolves, suppuration and granulation follow, and the cavity is partly filled by newly-formed vascular substance. It sometimes happens, however, especially if lint has been left within the orbit, that violent inflammation ensues, followed by suppuration, within that cavity, in the eyelids, or the integuments of the forehead, or even within the cranium. Mr Travers mentions that he lost a patient, a middle-aged countryman, otherwise in health, within a fortnight after this operation, owing to a suppuration of the dura mater, on the same side of the head. The attack of inflammation was sudden and rapid, commencing about a week after the operation, and ushered in by a severe rigor, after imprudent exposure to cold.[1]

10. An artificial eye can rarely be used with good effect after extirpation of the eyeball; never, indeed, if the eye had naturally been large and prominent. If it had been small and sunk, and the lids narrow, the application of an artificial eye may in some degree succeed. Dieffenbach has attempted to fill the orbit by a flap taken from the temple, and thus form a cushion for an artificial eye.[2]

[1] Synopsis of the Diseases of the Eye, p. 309; London, 1820.
[2] Journal Complémentaire des Sciences Médicales; Vol. xl. p. 391; Paris, 1831.

CHAPTER XVII.

ARCUS SENILIS.[1]

In old people, the cornea, a little within its circumference, not unfrequently presents an opaque ring of a grayish-white colour, more or less broad, and more or less complete. The opacity is often semilunar, and is situated at the upper or lower edge of the cornea. This *arcus senilis*, as it is termed, occurs without any previous inflammation, and has generally been ascribed to a diminished nutrition or marasmus of the part. The natural texture of the cornea is no longer recognisable on dissecting the part affected with arcus senilis. In some rare instances, a similar opacity is seen in young people.[2]

Arcus senilis has not been regarded as of much importance, in a practical point of view, except with regard to the section of the cornea, in extraction of the cataract. A broad arcus senilis has been stated as an objection to extraction, on account of the difficulty with which the incision unites, if it be carried through the opaque portion of the cornea. This alleged difficulty of union, however,

does not always occur; for I have seen the section of the cornea through an arcus senilis heal with perfect facility.

We owe to Dr Ammon[3] the interesting observation, that in those eyes where there is an arcus senilis of the cornea, a similar opaque ring exists round the margin of the crystalline body. The first time he noticed this curious fact, was in the left eye of a woman of 62 years of age. The lower half of the edge of the cornea presented an arcus senilis. The upper half, as well as the right cornea, was perfectly transparent. On dissecting the left eye, Dr Ammon was greatly surprised to find a crescentic opacity of the lower edge of the lens, exactly corresponding to the arcus senilis of the cornea. The capsule was perfectly natural.

Subsequent investigations by Dr Schön[4] have shown that arcus senilis of the crystalline body affects the posterior capsule more frequently than the lens, but that, in some instances, both the posterior hemisphere of the capsule and the lens are partially opaque, the opacity corresponding pretty nearly, in form and extent, to that of the cornea. The opacity at the edge of the lens is partly formed by streaks radiating inwards. No arcus senilis appears to have been detected in the anterior hemisphere. In several cases of external and internal arcus senilis, Dr Schön found the ophthalmic artery ossified.

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[1] *Gerontoxon externum et internum. Marasmus senilis corneæ et lentis. Macula arcuata.*

[2] Wardrop's Morbid Anatomy of the Human Eye; Vol. i. p. 144; London, 1819.

[3] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xiii. p. 114; Berlin, 1829.

[4] Ammon's Zeitschrift für die Ophthalmologie; Vol. i. pp. 119, 151; Dresden, 1831.

CHAPTER XVIII.

CATARACT.

SECTION I.—DEFINITION AND DIAGNOSIS OF CATARACT; METHOD OF EXAMINING CASES OF THIS DISEASE; CAUSES AND PROGNOSIS.

By the term *cataract*[1] is understood an opacity situated between the vitreous humour and the pupil.

Enumerating the parts so situated, we have, *first*, the posterior hemisphere of the crystalline capsule; *secondly*, the crystalline

lens; and *thirdly*, the anterior hemisphere of the crystalline capsule. Any of these parts may lose its natural transparency, and there will then be formed a capsular or a lenticular cataract, according as the opacity is seated in the capsule or the lens. Between the internal surface of the capsule and external surface of the lens, there exists, in the natural state, a considerable degree of adhesion, but in consequence of disease, an opaque fluid is sometimes effused within the capsule, so as to separate it from its natural cohesion with the lens, and form what is termed a Morgagnian cataract. Any opacity situated *in* or *within* the crystalline capsule, is termed a *true cataract*, and it is evident that all those above enumerated fall under this denomination.

Between the anterior crystalline capsule and the pupil lies the aqueous humour of the posterior chamber. This cannot become opaque without the whole of the aqueous humour being similarly affected; but it may be displaced by an opaque substance; as, coagulated lymph. Such a cataract is termed *spurious*, and has its seat *without* the capsule.

Practitioners in former ages were of opinion, that cataract was owing to a membrane preternaturally growing before the crystalline lens, and covering its anterior surface in the manner of a veil; and that the sight was restored by depressing the membrane with the needle. The erroneousness of this opinion was demonstrated in the course of the seventeenth century by Rolfink, Borel, and others. Dissection has shown that, while a membranous or spurious cataract may form between the pupil and the capsule, the most common cataract is lenticular, and that there are several varieties of true cataract.

Whether cataract be true or false, the opacity of a part naturally transparent, necessarily stops in a greater or less degree the light which should be transmitted through it; the impression on the retina is thus rendered imperfect; and partial blindness ensues. Cataract never produces total blindness.

When the term cataract is used without any appellative, lenticular opacity is generally meant. For instance, when we say that cataract is a slow disease, occupying months or years in its progress, it is of lenticular cataract that we speak; for all the others, and especially the spurious cataracts, may be the product of a few days, or hours. It sometimes happens, however, that even lenticular cataract is fully developed in a very short space of time. A patient was attending at the Glasgow Eye Infirmary, with glaucoma and amaurosis of one eye, but without any appearance of cataract. She was present as usual, on a Monday or Wednesday, the eye exhibiting exactly the appearances which it had done for some months before. On the Friday, I was surprised to find the surface of the lens completely opaque, and stellated by lines radiating from its centre. Richter relates a case in which cataract was formed in the course of one night. A patient, labouring under gout, had his feet exposed to a great degree of cold during the night, in consequence of

which, the gout retroceded, and he was deprived of sight. Richter saw him next morning, and found a complete pearl-coloured cataract.[2] Mr Wathen was of opinion that blacksmiths, and all mechanics who work near large fires, were more subject to cataracts than other persons, and he mentions that he had had two patients who were instantly seized with cataract, at the very time they were thus employed.[3]

Diagnosis. It is of much importance that we should distinguish incipient cataract from incipient amaurosis. In the fully developed state, these two diseases can scarcely be confounded by any one in the least acquainted with the diseases of the eye; but, in the early stages, such a mistake may readily be committed, and may be productive of serious bad consequences. For example, if a patient with incipient amaurosis presents himself to a practitioner who mistakes the case, and supposes it to be one of incipient cataract, the advice which he will give, will be to wait with patience till the disease be fully developed, and then to submit to an operation. Should the patient return after some months with a fully developed amaurosis, instead of a cataract, the practitioner would necessarily feel, that, by his ignorance or inattention, he had lost the only season for treating an amaurotic affection with success.

The symptoms of cataract and amaurosis, as indeed of all diseases whatever, are *subjective* or *objective*; that is to say, they consist either in certain feelings which the *patient experiences*, as impaired vision, headach, giddiness, &c. or in certain changes which the *observer perceives* in the form, colour, texture, consistency, vascularity, and mobility of the different parts of the organ of vision. Both sets of symptoms will require to be very closely examined in suspected cases.

Subjective signs. 1. As to the impaired state of vision which attends both these diseases in the incipient stage, the patient affected with either of them, finds a difficulty in discerning objects with distinctness. In cataract, this difficulty generally increases slowly for a time, and is compared to what might be produced by a diffused mist, thin cloud, or gauze, intervening between objects and the eye, and gradually becoming thicker, till suddenly it becomes so thick that every thing seems concealed by it: whereas, in amaurosis, the first attack of dimness of sight is often sudden, and, being partial, is compared to a fly, or other small black spot or spots, covering certain parts only of an object. It is a fact, however, which strikingly illustrates the uncertainty which attends the diagnosis of cataract and amaurosis, that muscæ volitantes, as the appearance of dark spots before the eye has been termed, are sometimes a precursor of cataract, while in other cases, this symptom continues for many years, without ending either in the one or other of these diseases. On the other hand, amaurosis not unfrequently declares itself in the early stage by the sensation of a gauze or mist, which slowly increasing in density, at length totally deprives the patient of sight. So complete a degree of blindness never occurs in cata-

ract. That, however, is of little consequence, so far as our present object is concerned, namely, the diagnosis in the incipient, not in the advanced stage.

2. We generally find that the sensation of a mist or cloud is perceived most when the cataractous patient looks straight forward, and that he sees considerably better when he looks sideways. This circumstance might appear likely to afford ground for distinguishing incipient cataract from amaurosis, were it not well ascertained, that also those who begin to be affected with diminished sensibility of the retina, are in many instances able to see things placed to one side, much better than what stands directly before them; and that some, in whom amaurosis is even far advanced, continue to see only when they look inwards or outwards, while in every other direction, they see very obscurely, or not at all.[4]

3. The different degrees of light in which those affected with incipient cataract or amaurosis see best, are worthy of attention. In those cases in which vision begins to fail from diminished sensibility of the retina, there is in general a desire for an increase of light; when the patient reads with candle-light, he brings the book close to the candle; and his period of most distinct vision is noon-day, when objects are most brilliantly illuminated by the sun. This is the very time when the cataractous patient sees worst. So much light causes the pupil to contract, fewer rays of light enter the eye, and hence vision is obscure; but in the twilight, when the pupil is dilated, more light is admitted, and the patient finds his vision greatly improved. To witness the effects of moderating the intensity of the light, and thus allowing a greater quantity of it to penetrate to the retina, we require only to make the patient look to and from the window. In the former position, he sees perhaps very little; but turn his back to the light, and he instantly discerns, more or less distinctly, every object around him. Yet even this must not be absolutely depended on. We meet with amaurotic patients, to whom strong light is distressing, and who see best with a moderate degree of illumination.

4. To the patient affected with incipient amaurosis, the flame of a candle generally appears broken and confused, iridescent, and spreading out into rays. To him who has an incipient cataract, a candle or a street lamp seems expanded into a large globe of weaker light; it looks, to use the phrase of a countryman at the Glasgow Eye Infirmary, as if "every lamp was as big as a corn-sieve."

5. It is rarely the case that incipient amaurosis is not attended by a variety of other subjective symptoms besides failure of sight; especially by headach, vertigo, and derangement of the digestive organs. Incipient lenticular cataract most frequently occurs without any such combination of complaints.

Objective signs. 1. There are few cases of amaurosis, even in the incipient stage, in which the natural movements of the eye are perfectly retained. No impediment of this kind is present in cataract; the patient opens the eyes, and converges them towards objects,

without the least difficulty, and in a manner perfectly natural. But in almost all cases of amaurosis, we may observe a want of direction and a vacant expression in the eyes, sometimes accompanied by strabismus.

2. The mobility of the iris affords a valuable ground for diagnosis; for in incipient cataract, the pupil contracts and expands as extensively and as vividly as in the healthy state of the eye, whereas in incipient amaurosis, if the pupil is not already dilated and fixed, its motions are limited and slow. If we apply belladonna, for the purpose of dilating the pupil, in half an hour this is fully accomplished, if the case be one of cataract; but after several hours, there is generally little dilatation produced, if amaurosis be present.

3. It is rarely the case, even in incipient amaurosis, that the pupil presents the jet-black colour of health. The appearance, however, is not so much an actual opacity, as a paleness, or greenishness. This symptom is what is termed *glaucoma*, which has by mistake been attributed to opacity of the vitreous humour. Dissections of the eye in the state of glaucoma have convinced me that yellowness of the central part of the lens, without opacity, is the cause of this symptom. I am speaking of incipient glaucoma, for in the advanced stage, the kernel of the lens is dry, of a reddish-brown colour, and has lost in part its transparency.

To distinguish glaucoma, from cataract, especially in the incipient stage, proves to beginners one of the most difficult pieces of diagnosis, and sometimes not to beginners only, but to those who for a length of time have attended to the diseases of the eye. About ten years ago, a gentleman was sent to me by his brother, a medical practitioner in the country, desirous to know if I thought the cataracts, which he said I would see in his eyes, were ready for operation. The disease was glaucoma, with a great degree of shortness of sight, but without any cataract. With much difficulty could I convince the practitioner of the real nature of the case, so wedded was he to the opinion that the appearance which he saw through the pupil was cataract.

Attention to the following circumstances, will in general enable the careful observer to discriminate between glaucoma and cataract.

α. The cloudiness in glaucoma is always of a greenish hue, whereas, in incipient cataract, the opacity is of a milk and water colour.

ε. The opacity in glaucoma is best seen when we look directly into the pupil, and disappears in a great measure, or altogether, when we look sideways into the eye. In cataract, the opacity is seen whether we look sideways or directly.

γ. In glaucoma, the disease appears to be seated at a considerable distance behind the pupil, or even deep in the vitreous humour, the superficial laminæ of the lens are evidently not involved, and the opacity seems surrounded by a transparent ring. In lenticular cataract, the opacity affects the surface of the lens, is close behind the pupil, and seems bounded by the edge of that aperture. In posterior

capsular cataract, the opacity is deep in the eye, but is always streaked; whereas, the glaucomatous reflection is always uniform, never spotted, nor radiated.

δ. When we examine narrowly the surface of a cataractous opacity, especially while concentrating the light upon it by means of a double-convex lens, it generally appears slightly rough, and somewhat dull, in these respects forming a striking contrast to glaucomatous opacity. Speaking of glaucoma, Maître-Jan[5] justly remarks, that "les cataractes *luisantes* sont toûjours très suspectes."

ε. The eyeball, in glaucomatous amaurosis, always feels firmer than natural; while in cataract, it presents its usual degree of resistance to the pressure of the finger.

ζ. Having dilated the pupil of the suspected eye by means of the extract of belladonna, the state of the crystalline should be examined catoptrically, according to the method recommended by Professor Sanson. The observer and the patient should be placed in moderate day-light; the patient's back is to be turned towards the window; he should be seated, so that the observer may look rather down into the eye than upwards; and a candle is to be used which burns steadily, and does not blaze much.

When a lighted candle is moved before a healthy eye, at the distance of a few inches, three reflected images of it are seen; viz. an erect one from the cornea, a second erect one from the anterior surface of the crystalline, and a third, an inverted one, from its posterior surface. The second or deep erect image, which is produced by the anterior surface of the crystalline, is not nearly so sharp as the inverted image, formed by the posterior surface.

The anterior surface of the crystalline being the segment of a larger sphere than the posterior, and being convex externally while the other is concave, the deep erect image is larger than the inverted one, and appears behind it. The deep erect image even appears larger than the image from the cornea, being magnified by the aqueous humour, through which we see it. The inverted image is very minute. We require to move the candle in order to see it. If the candle is moved to the right, the inverted image is seen to shift to the left; if the candle is raised, the inverted image is seen to descend; and *vicibus versis*.

In cataract and glaucoma, the superficial erect image, which is formed by the cornea, suffers no change. Cataract, even at an early stage, obliterates the inverted image, and renders the deep erect one very indistinct. Glaucoma, only when much advanced, obliterates the inverted image, while, in all its stages, it renders the deep erect one more evident than it is in the healthy eye.

Dr Staberoh has remarked[6] that in estimating the changes which are observed to occur in the appearances of the images reflected from the eye in its several diseased states, it is necessary to take into account two sources of these changes, viz. the state of the surfaces which form the images, and that of the media through which we see them.

The following particulars are worthy of the careful attention of the observer:—

(1.) In incipient lenticular glaucoma, or what we may call the *first* degree of the disease, both the deep erect image, and the inverted one, are distinct. The deep erect image is rather larger and brighter than in the healthy eye. It is also somewhat of a yellow hue. With the advance of glaucoma, the inverted image becomes larger, and of a yellowish colour. Its outline becomes sooner diffused than that of the deep erect image.

(2.) In mean cases, or what we may call the *second* degree of glaucoma, the inverted image is pretty distinct, when formed near the edge of the crystalline. If it is the right eye which is the subject of examination, and if the observer moves the candle towards the right side of the patient, the inverted image will be seen behind the nasal edge of the pupil; but if the candle be brought slowly in front of the eye, the inverted image, as it moves across the pupil, is seen to become less and less distinct, and in some cases is altogether extinguished, till on the candle approaching the patient's left side, the inverted image re-appears behind the temporal edge of the pupil, being again formed by the circumferential portion of the posterior capsule. No such appearance as this is seen in lenticular cataract, a disease which always affects the superficial laminæ of the lens in such a way as to prevent the formation of the inverted image by any part of the posterior surface of the crystalline body. The extinction of the inverted image, when the candle is placed directly before the pupil of an eye affected with glaucoma of the second degree, is owing to a loss of transparency in the kernel of the lens, which suffers, as I have already mentioned, a peculiar degeneration, characterized by dryness of substance, and a reddish-brown colour.

(3.) In complete lenticular glaucoma, or glaucoma of the *third* degree, the inverted image is no longer visible even at the edge of the lens.

(4.) The deep erect image is better seen in the second and third degrees of glaucoma than in the healthy eye. It is large and evident, but its outline is not sharp; so that it often appears like a diffused blaze. The fact that it is more distinct than in the healthy eye, is to be attributed to the reddish-brown kernel of the lens acting as a foil to the image.

(5.) In incipient lenticular cataract, the inverted image, though changed neither in colour nor in size, is indistinct, and its outline as if washed off. It is extinguished long before the cataract is fully developed; a fact of the greatest importance in the diagnosis which we are now considering. In capsulo-lenticular cataract, the inverted image fades much sooner than in mere lenticular cataract, and even when the capsule, or the superficial substance of the lens, seems to be alone opaque, the inverted image disappears much sooner than we should expect from the apparently moderate degree of opacity.

(6.) In lenticular cataract, there is merely a general reflection, but no distinct image, from the anterior surface of the crystalline body.

(7.) If the lens is not in its place, but has been absorbed in consequence of an injury, been removed by an operation, or fallen down into a dissolved vitreous humour, neither inverted nor deep erect image is formed.

In the diagnosis of incipient cataract and incipient amaurosis, the catoptrical test is perfectly decisive; for in amaurosis, uncombined with glaucoma, the three images are always distinct, while in even the early stage of cataract, the inverted image is obscure. The diagnosis of incipient cataract and incipient glaucoma requires the catoptrical test to be familiar to the observer, else he may not be able to distinguish, that when the candle is held in the axis of the eye, the inverted image is indistinct in both diseases, but whenever it is moved to one side, it becomes distinct in glaucoma, and remains obscure in cataract.

η. Glaucoma proceeds in general very slowly in its course. Years pass over without much more appearance of opacity than what was at first observed, and with little or no farther loss of sight; while in cataract, vision generally declines rapidly, keeping pace with the growing opacity.

Circumstances to be attended to in cases of cataract. To ascertain with accuracy the existence of cataract, and the nature of any cataract which may present itself, it is necessary to attend minutely to the following circumstances:—

1. The *opacity;* its colour, extent, form, and seat. Whiteness denotes either a dissolved lens, or a capsular cataract; grayness, a lenticular cataract; amber, or dark grayness, that the lens is hard; light grayness, that it is soft. If the whole extent of the pupil is uniformly opaque, the cataract is lenticular; if the opacity is streaked or speckled, it is capsular. It is probable, if the opaque streaks radiate from a centre, that the posterior hemisphere of the capsule is the seat of the disease; if the form of the opacity is convex, that the anterior hemisphere of the capsule of the lens is the part affected; if concave, the posterior hemisphere. With the light concentrated on the pupil, by means of a double-convex glass, all these particulars are carefully to be ascertained.

2. The *iris* is to be examined; its colour, mobility, form, situation, and the shadow it throws upon the cataract. Is it green, or otherwise discoloured, denoting previous inflammation, which may have left the eye in a state unfavourable for any operation? Covering the eye which we are not examining, that all sympathetic motion of the iris may be avoided, we examine whether the pupil moves briskly, and extensively, as in health; or slowly, and to a very limited degree, so as to lead to the suspicion of the retina being imperfectly sensible. Is the pupil fixed, and irregular, as if adherent to the capsule, in consequence of effused lymph; or does the iris tremble on every motion of the eye, an appearance denoting a paralytic state of its fibres, attended by a dissolution of the vitreous humour, and generally by amaurosis? Is the iris convex, and nearer to the cornea than natural, an unfavourable circumstance for

the operation of extraction? Is the shadow thrown by the iris on the opaque body distinct, or is there no shadow? This depends on the distance of the opaque body from the iris, or, in other words, the depth of the posterior chamber. If there is no shadow, the posterior chamber is probably obliterated by the pressure of a large and soft lenticular cataract. If the shadow is distinct, the lens is probably small and hard.

3. The *eyeball in general* deserves attention; its colour, degree of firmness, size, and place in the orbit. A dingy colour of the sclerotica, marks ill health, which, of course, is unfavourable for attempting an operation. A boggy eye marks deficiency of vitreous humour, attended by amaurosis. A stony hardness of the eye denotes glaucoma, with a superabundance of dissolved vitreous humour. An eye considerably below the medium size never recovers more than a very imperfect degree of sight. A very prominent, or a very sunk eye is unfavourable for extraction. In the former case, if the section of the cornea be made downwards, the lower lid tends to intrude between the lips of the wound, and keep it from healing. In the latter case, the section of the cornea necessary for extraction can scarcely be performed.

4. The *degree of vision* must be carefully examined, both as denoting the sentient state of the retina, and serving to determine the propriety of an immediate operation. If the patient can distinguish the objects around him, while regarding them with his back turned to the light, the operation ought to be deferred till the sight is more obscured. If, when turned to the light, he distinguishes the shade cast by the hand, when it is moved before him, the retina is sensible, and the operation may be performed with some prospect of success. If he sees the shade of a single finger, the retina is quite healthy.

5. The *mobility of the eye* is a point of considerable importance. A squinting eye, or one which moves readily only in one direction, or with which the patient perceives the light only when the eye is turned very much in one direction, is not likely to be much benefited by the removal of a cataract.

6. The *age of the person* affects materially the consistence of the lens, whether in health or disease. Soft and gelatinous in childhood and in youth, firm at middle age, hard in old age, the lens affected with opacity, may readily be divided in the first two periods by the needle, and will dissolve in the aqueous humour, while in the last two, these processes may be difficult or impracticable.

7. The young practitioner ought never to pronounce absolutely even on the existence of cataract, without dilating the pupil by *belladonna*, and examining the eye *catoptrically;* and the most experienced may derive advantage from exposing in this way the whole field of the disease to his view, and testing the state of the crystalline. It is important also to observe the degree of celerity with which the pupil yields to the influence of belladonna. (See page 638.)

Proximate causes. 1. The most frequent kind of cataract is that

which occurs in old age, independently of inflammation or injury. We ascribe this variety of cataract to a defective nutrition, gradual decay, or marasmus of the lens. But in fact we are unacquainted with the proximate cause of this sort of cataract. Old age is certainly not its sole exciting cause, for we meet with it in young persons and even in infants. The process has been said to begin in the centre of the lens, where its nutrient vessels are smallest; but this is certainly incorrect. If we examine a cataractous lens immediately after it has been extracted, we shall find that the whitish opacity which constitutes cataract and has impeded vision, affects principally its superficial laminæ; the interior lamellæ being generally pretty transparent, although often presenting the amber or the reddish-brown hue of glaucoma. The superficial laminæ of a cataractous lens, not only present a state of opacity, but appear to have undergone a peculiar change, which, by some, has been compared to a coagulation, and by others to a necrosis, and which is entirely wanting in the glaucomatous state of the lens. In cataract, the lens also loses its natural adhesion to the internal surface of the capsule, and in some cases, an effusion of fluid takes place between the capsule and the lens, forming a *humor Morgagni*.[7]

2. Next in point of frequency is cataract from injuries. These, rupturing the capsule, will admit the aqueous humour into contact with the lens. Even the smallest puncture of the capsule will bring on lenticular cataract. If the rupture of the capsule is considerable, in four-and-twenty hours we see a considerable portion of the lens opaque, an effect attributed to the coagulating influence of the aqueous humour, but which is perhaps owing to inflammation excited in the lens.

Should the rupture of the capsule remain open, the whole lens may dissolve in the aqueous humour, be absorbed, and thus the pupil clear. In this case, opaque portions of the capsule often remain visible, although by the dissolution of the lens, a considerable share of vision is restored. If the wound of the capsule closes, the dissolution of the lens ceases, the cicatrice of the capsule assumes a chalk-white appearance, and thus a capsulo-lenticular cataract is formed.

It has been conjectured that the capsule is occasionally ruptured in that tetanic state of the eyes which attends the convulsions of young children, so that the aqueous humour being admitted within the capsule, the lens becomes opaque. In some cases, a blow on the eye, without any penetration of its tunics, ruptures the capsule; while in others, cataract, generally attended by amaurosis, follows a blow, without any apparent rupture or dislocation. (See Chapter XI. Section iv.)

3. Inflammation is in some cases the proximate cause, not merely of spurious, but even of true cataract. Indeed, anterior and posterior capsular cataracts may be compared to specks of the cornea; while in some instances, the lens also, from long-continued inflammation, becomes opaque, dissolves into a milk-like fluid, or even

suppurates. (See Chapter XII. Section xxvi.) Ossification of the capsule and lens is another termination of inflammation in these parts, and has already been spoken of at page 581. The different varieties of iritis are sometimes followed by opacity of the capsule and lens. Such cataracts are generally attended by adhesion of the iris to the capsule.

Remote and predisposing causes. Many of the remote and predisposing causes of cataract have escaped detection; but the following are more or less frequent in their operation.

1. Old age. Of 500 cataract patients treated by Dr Fabini,[s] 268 were males and 232 females. The ages of these individuals were as follows:—

From 1 to 10 years	14
" 11 " 20 "	16
" 21 " 30 "	18
" 31 " 40 "	18
" 41 " 50 "	51
" 51 " 60 "	102
" 61 " 70 "	172
" 71 upwards	109
	500

The disposition, then, to cataract is small before the age of 40, but is much increased as life advances beyond that period.

2. Hereditary tendency. Instances are not uncommon of this disease attacking individuals, one of whose parents had been affected with it about the same period of life; while in other instances, several brothers and sisters are either congenitally the subjects of cataract, or become cataractous in after-life, and about the same age.

3. Those who are much exposed to strong fires, as glass-blowers, forgemen, cooks, laundresses, &c. are supposed to be more frequently than others, the subjects of this disease.

4. In the early years of my practice, I met with a greater number of stocking-weavers, affected with cataract, than of any other single trade. The disease was often attended in those persons with amaurosis. Their sedentary life, and the intense looking at an object in motion, which their occupation requires, probably caused their eyes to become thus diseased.

5. The use of wine and spirituous liquors, but especially the former, appears to favour the production of cataract, which is a common disease in all countries where wine is so cheap as to be the habitual beverage of the lower orders.

6. The inhabitants of volcanic countries, as Naples and Sicily, are said to be very subject to cataract.

7. The sudden application of cold to the extremities of the body, so as to check any natural or morbid effort or evacuation, such as menstruation, or a paroxysm of gout, is apt to produce cataract.

8. As a general rule, the subjects of cataract enjoy good general health. They complain more frequently of rheumatic affections,

than of any other; but the majority have not been troubled with any disease of importance.

9. I have in three instances seen lenticular cataract attack women of from 18 to 25, labouring under diabetes mellitus.

General prognosis. The prognosis in cases of cataract must vary considerably according to the particular species which is present, the local complications of the disease, and the age and general health of the patient.

In the incipient stage, we seldom hesitate to prognosticate, especially if the lens itself be the part affected, an uninterrupted increase of opacity, and decrease of vision, till a perception of light and shade be all that is retained. Should the anterior hemisphere of the capsule be the seat of partial opacity, the disease may remain stationary for a number of years, or through the whole of life, without affecting the transparency of the lens; but posterior capsular cataract rarely continues long without bringing on lenticular opacity.

With regard to the ultimate prognosis, practitioners are too much in the way of raising sanguine hopes in the minds of patients affected with cataract, that by surgical operations on the eyes, their sight may be almost perfectly restored, not weighing with sufficient consideration, the frequency with which other morbid changes in the organ of vision are associated with this disease, especially in advanced life, such as dissolution of the vitreous humour, absorption of the pigmentum nigrum, and imperfect sensibility of the retina.

The dangers, too, attending the operations for cataract, are much too lightly estimated, in pronouncing an ultimate prognosis. Operators on the eye seem to think that they have done enough, when by the publication of a few successful cases, they have persuaded the profession and the public of their expertness; but unless the circumstances of each case are minutely detailed, and a history given, not of select cases, but of every case occurring during a year, or longer period, and each history brought down, not merely to a few days or weeks after operation, but at least to several months, no conclusion can be drawn regarding either the abilities of the operator, the merits of his particular mode of operating, or the general success of operations for the cure of cataract. Such facts only as the following are capable of serving as data for an ultimate prognosis in cataract.

1. The Royal Academy of Surgery, solicitous to know the truth with respect to Daviel's success, applied to M. Caqué, one of their correspondents, who resided at Rheims. This gentleman by a letter dated 15th January 1753, informed them, that Daviel had there operated on 34 cases; 17 of which were perfectly restored to sight, eight saw indifferently, and nine received no benefit.[9]

2. In June 1753, La Faye, Poyet, and Morand, operated the same day upon 19 cataracts; the two former by extraction, although each according to his own method; Morand, by depression. Of those operated on by La Faye, two saw well, two indifferently, and

two received no benefit. Two of Poyet's cases saw well, two less, one could discover only day-light, and two nothing. Three of Morand's patients could see tolerably well, and three remained as dark as before.[10]

3. Mr Sharp in a paper read before the Royal Society, 22d November 1753, gives an account of his having performed the operation of extraction on 19 eyes, with about half of which, he had what he thought tolerable success; though he grants that not a single one escaped a considerable degree of inflammation.[11]

4. Dr Tartra[12] has published the results of the operations for cataract, performed in the *Hôtel-Dieu* at Paris, from the commencement of 1806 to 1810 inclusively. The total number of cases was 113, 70 of which were extracted, and 43 displaced. Nineteen of the 70 extractions, and 24 of the 43 displacements were successful; 6 extractions, and 4 displacements, were followed by partial success; 8 extractions, and 5 displacements, were total failures; and the results of the rest were either unknown, or more or less unfavourable. Dr Tartra observes, that by adding to the 43 successful cases, the other 10, where the operation was attended by partial success, it appears that nearly half the patients operated on, obtained a greater or less degree of sight. He adds that it is generally thought that two out of five patients operated on for cataract, recover their sight.

5. During the year 1830, the autumn of 1832, and the spring of 1833, Professor Roux operated by extraction, on 115 patients, and 179 eyes, at the *Charité* in Paris, with the following results:—

73 patients recovered sight, *viz.* .	{ 40 men. 33 women.
97 operations succeeded, in . .	{ 52 men. 45 women.
72 operations failed, in . .	{ 32 men. 40 women.
10 partially succeeded, in . .	{ 6 men. 4 women.

Professor Roux was successful then, in somewhat more than five out of every eight patients on whom he operated, and in somewhat less than five out of every nine eyes.[13]

Such are some of the data, on which to found an ultimate prognosis with regard to cataract, furnished from the practice of general surgeons, some of whom were probably not very minutely acquainted with the diseases of the eye, nor particularly skilful in the operations for cataract, or the after-treatment. In the practice of one thoroughly acquainted with eye-diseases, able to discriminate the cases fitted for extraction, and those fitted for division, able to perform those operations well, and careful and skilful in the after-treatment, I should think $\frac{3}{4}$ths of those operated on would recover useful vision, and $\frac{2}{3}$ds excellent vision.

The constitution of the patient, as well as the state of his eyes, bears strongly on the probabilities of an operation. In a scrofulous or an arthritic subject for example, an operation for cataract, on

account of the danger of inflammation, is not nearly so likely to be successful as in a healthy person.

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[1] From καταῤῥάσσω, *to break*, or *disturb*; vision being broken, or disturbed by this disease. Γλαύκωμα of Hippocrates. Τύφλωμα of Galen. *Suffusio* of Celsus. *Gutta opaca* of the Arabians. *Caligo lentis* of Cullen. *Der graue Staar* of the Germans.

[2] Treatise on the Extraction of the Cataract; translated from the German; p. 3; London, 1797.

[3] Dissertation on the Theory and Cure of the Cataract, p. 12; London, 1785.

[4] See Hey, in Medical Observations and Inquiries; Vol. v. p. 27; London, 1776.

[5] Traité des Maladies de l'Œil, p. 225; Troyes, 1711.

[6] London Medical Gazette; Vol. xxi. p. 107; London, 1838.

[7] I have ascertained by dissection, that the lenticular cataract of old persons is occasionally attended by ossification of the arteries of the brain. Is it frequently so accompanied? If frequently, are these two phenomena connected?

[8] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde; Vol. xiv. p. 545; Berlin, 1830.

[9] Mémoires de l'Académie Royale de Chirurgie; 12mo; Tome v. p. 397; Paris, 1787.

[10] Ibidem, Tome vi. p. 332.

[11] Philosophical Transactions for 1723; Vol. xlviii. Part i. p. 322; London, 1754.

[12] De l'Operation de la Cataracte, p. 83; Paris, 1812.

[13] Essai sur quelques points de l'histoire de la Cataracte, par Theodore Maunoir, pp. 78, 84; Paris, 1833.

SECTION II.—GENERA AND SPECIES OF CATARACT.

The most important classification of cataracts is that which arranges them into true and spurious; the *true* having their seat *in* or *within* the crystalline capsule, and the *spurious without*. The distinction of the genera and species, admitted under each of these classes, is founded either upon the particular part affected, or particular substance forming the impediment to vision.

True cataract frequently exists without any complication; spurious cataract is always combined with other morbid changes in the eye.

CLASS I.—TRUE CATARACTS.

GENUS I.—LENTICULAR CATARACT.

Opacity affecting only the lens is the most frequent kind of cataract. Its colour and consistence vary according to the period of life at which it occurs. In old persons, in whom it is most common, the opacity is generally pretty dark, of a yellowish or amber-gray colour; in younger subjects, it is often of the hue of half-boiled white of egg; in children, still lighter, and approaching more to the colour of milk diluted with water.

In young persons, the whole substance of the lens often appears cataractous; in the old, it is generally only the surface, and chiefly the anterior surface, which is affected with cataract, the rest being amber-coloured or glaucomatous. In middle-aged subjects, the external half of the cataractous lens is not unfrequently whitish, and so soft that it mixes with the aqueous humour, when acted on by the needle, while the central half is hard and amber-coloured.

The opacity is generally uniform in colour, and presents itself equally behind the whole field of the pupil. Sometimes it has a pearly shining appearance, occasionally it is marked by radii, stretching from its centre towards its circumference, the lens already tending to break into such divisions as we see it fall into when left to putrefy or to undergo desiccation. Such a lens, even in an old person, will break into fragments, under the needle. It is not an uncommon appearance to see opaque striæ, stretching from the circumference of the lens a short way into its substance. If such striæ run upon the back of the lens, towards its centre, they seem to be situated in the vitreous humour; but this is an optical illusion. The opaque surface of the lens appears plain, or slightly convex, and at a sufficient distance behind the pupil, to permit a shadow to be cast on it by the iris.

A lenticular cataract, after it is extracted from the eye, always appears less white and more of an amber colour, than it did while in the eye. Some are of a mahogany colour, and extremely hard. I have seen a few cases of lenticular cataract, in which the opacity was so very dark, that, without close examination, the disease might have passed without detection. On concentrating the light on the pupil, the opacity appeared striated, and approaching to black. Such are the cases which have been called *black cataracts*.[1] I have not seen the lens after it was extracted, in any of those cases.

Lenticular cataract has rarely any influence on the motions of the pupil, being scarcely ever so large as to obliterate the posterior chamber and press against the iris. The eyeball is in general healthy, except in old people, in whom the opacity of the lens is often accompanied by dissolution of the vitreous humour, and deficiency of the pigmentum nigrum. The patient is never totally deprived of sight by lenticular cataract. In by far the greater number of cases, he continues to distinguish not only light and shade, but even bright colours; and in the twilight, when the pupil expands, he often discovers the forms of large objects. On entering a bright light, he sees none; and in some rare cases, the opacity is so dense to the very circumference of the lens, that even light and shade are distinguished with difficulty.

Lenticular cataract is the most favourable for operation, and a pure case of it, with a lively pupil, ought always to be selected by the young operator, for his first extraction.

GENUS II.—CAPSULAR CATARACT.

Species 1. *Anterior Capsular Cataract.*

The anterior hemisphere of the capsule is much thicker, and more consistent than the posterior; it exactly resembles the lining membrane of the cornea, and like it, possesses an elasticity of texture, by which, when lacerated or freed from its natural connexions, it rolls itself together, like a piece of parchment or goldbeater's leaf. It is much more subject to opacity than the posterior hemisphere, and is often partially opaque when the posterior is transparent.

The opacity in anterior capsular cataract is never uniformly diffused like lenticular opacity, but always streaked or spotted; and is generally of a chalky or pearl-white colour. Sometimes there is only one spot; in other cases, there are many. They are very irregular in form and disposition; some of them stretching from the edge of the capsule, others occupying its centre. In some cases, we observe a single pyramidal speck projecting from the centre of the capsule. On operating, I have sometimes found those specks to separate readily from the capsule, on being touched with the needle, and to fall forward through the dilated pupil into the anterior chamber. In most cases, however, the deposition appears to be in the membrane, not on it merely.

The loss of sight may be greater or less than in lenticular cataract, depending partly on the place and extent of the specks, partly on coincident changes in the eye. Not unfrequently so much vision is preserved, that it would be unwarrantable to operate.

As we have reason to believe that anterior capsular cataract is in almost all instances the result of inflammation, we might expect to find it frequently, or always, conjoined with marks of iritis. Yet this is rarely the case. The blood-vessels which nourish the anterior hemisphere of the capsule, are derived chiefly from the ciliary processes, and not from the iris. They are not supposed to be the chief source of the nutrition of the lens. Certain it is, that anterior capsular cataract is seldom combined with morbid changes in the iris, and that it often continues for many years, or for life, without leading to lenticular opacity.

Anterior capsular cataract arises not unfrequently from ophthalmia neonatorum. (See page 402). I have seen it occur also during scrofulous ophthalmia.

Species 2. *Posterior Capsular Cataract.*

Opacity of the posterior hemisphere of the crystalline capsule is much rarer than that of the anterior. The blood-vessels which nourish the lens are supposed to be chiefly derived from the posterior capsule, and this is thought to afford an explanation of the fact, that an opaque state of the posterior capsule is much more apt than a similar condition of the anterior, to superinduce opacity of the lens. When it does so, the ultimate changes of the posterior

hemisphere of the capsule, are of course hid from our view. In an instance which came under my observation, posterior capsular cataract occurred suddenly in both eyes, in consequence of stoppage of the menses from cold, and was speedily followed by lenticular opacity.

The opacity, in posterior capsular cataract, is never uniformly diffused, but always exhibits the form of radiating lines, proceeding from the centre of the affected membrane. The ground upon which these opaque lines are placed, is evidently concave, while the lines themselves, being seen through the crystalline, have a watery dulness of appearance, which forms a striking contrast to the sharp chalky whiteness of the specks in anterior capsular cataract. Occasionally both hemispheres of the capsule are the seat of partial opacity, the lens remaining transparent. I have known this state continue in both eyes for more than eight years, without producing lenticular opacity. Both hemispheres were streaked with opaque lines. When the pupils were in their natural state, the patient saw very little, but during all the period above mentioned she was in the use of a vinous solution of belladonna, which she generally dropped every morning upon the eyes. This remedy never appeared to lose its effect, and the patient fully appreciated its value.

Posterior capsular cataract has no influence on the pupil; but I have once or twice observed it, combined with amaurosis, and in these cases the iris was inactive. I have repeatedly met with it without any complication whatever.

Vision is impaired by this cataract in very various degrees, the patient being able, in some cases, to read with the aid of a magnifying glass; while in other instances, he is almost deprived of sight.

GENUS III.—MORGAGNIAN CATARACT.

The effusion of an opaque fluid between the lens and its capsule, forms one of the rarest kinds of cataract. It is generally followed by dissolution of the lens, and not unfrequently by capsular opacity.

So long as the cataract consists in a mere effusion between the capsule and lens, it presents a cloudy appearance, as if formed of milk and water imperfectly mixed. It is stated, that if the eyeball is repeatedly rubbed with the finger, through the medium of the eyelid, the clouds of opacity change their outline and position; and sometimes they do so, merely on quick motion of the eye from side to side.

The capsule is distended in cases of Morgagnian cataract, and, pressing against the iris, obliterates the posterior chamber, and impedes the motions of the pupil.

When the disease is purely Morgagnian, vision is sometimes but slightly impaired, small objects escaping the observation of the patient, especially after the eye has been rubbed or moved; but after the lens dissolves, the sight is limited to the perception of light and shade.

Beer observes, that this disease is sudden in its accession. The

only cause he had known to operate apparently in its production, was exposure of the eyes to the evaporation of mineral acids, during the oxidation of metals. The only instance of the disease, which I have seen, was in a lady, who embarked at Liverpool with her sight perfect, was very sick during her passage to Greenock, and next day landed there with a cataract in one of her eyes, such as I have not observed in any other case, and which corresponded to the description of Morgagnian cataract, except that I could see no change in the form of the opacity after rubbing the eye.

Pure Morgagnian cataract is not to be touched in the way of operation; and may perhaps be curable by antiphlogistic means, if attended to sufficiently early.

GENUS IV.—CAPSULO-LENTICULAR CATARACT.

This is a union of the first two genera, or even of the three kinds of cataract, already described. Not only is the opacity of the capsule various in degree and extent, but even in more essential circumstances are the different cases of capsulo-lenticular cataract so unlike to each other, that it is necessary to distinguish several species of this genus. The circumstances in question influence the choice and manner of operation.

Species 1. *Central Capsulo-lenticular Cataract.*

This species presents in general a very limited white point in the centre of the lens and anterior capsule, which is apt to remain unchanged through life. We meet with it not unfrequently in children, whom it appears to render myopic, and so deficient in sight that they cannot learn to read. In some instances the lenticular opacity is considerably broader than the capsular, and not so opaque.

This disease is perhaps in some instances congenital. It frequently follows ophthalmia neonatorum. In one case which fell under my observation, it was not observed till after scarlet fever, and was supposed to have originated in that complaint.

When very small, it is not to be interfered with.[2]

Species 2. *Common Capsulo-lenticular Cataract.*

Common capsulo-lenticular cataract may originate in the capsule, in the lens, or in a Morgagnian effusion. Injury of the capsule and lens gives rise to this kind of cataract, but its most frequent cause is probably an insidious inflammation of the capsule.

Part only or the whole of one or other, or of both hemispheres of the capsule, may be opaque. The lens also may be partially or wholly opaque. The opacity is partly pearly, as in anterior capsular cataract; partly milky or cloudy, as in the Morgagnian. The specks of the capsule have innumerable forms, and on these were founded the old distinctions of *cataracta marmoracea*, *fenestrata*, *stellata*, *punctata*, *dimidiata*, &c.

In some cases, the opacity of the lens and capsule is so partial,

that on dilating the pupil by belladonna, the patient's vision is considerably improved. The lens presents various degrees of consistence in capsulo-lenticular cataract; being sometimes hard, in other cases partially or completely converted into an opaque fluid. In the latter state, it sometimes distends the capsule so much, that the posterior chamber is obliterated, and the iris prevented from moving with facility. Belladonna dilates the pupil slowly, which still more slowly returns to its former size. It is sometimes the case, that even the anterior chamber is diminished by the pressure of the distended capsule, and the consequent advancement of the iris.

Sensibility to light is occasionally very feeble in capsulo-lenticular cataract, owing, in some cases to the density of the opacity, in others, to the presence of amaurosis. Cataract supervening to amaurosis, and especially to traumatic amaurosis, is frequently capsulo-lenticular. The cataract is slow in its progress, under such circumstances. At length the vitreous humour dissolves, and the iris and the cataract become tremulous.

In some cases of capsulo-lenticular cataract, with dissolved lens, it is observed, when the pupil is dilated by belladonna, that if the patient remains perfectly at rest, and in the sitting position, for a quarter of an hour, the whiter and thicker part of the dissolved lens falls to the bottom of the cavity of the capsule, and the anterior hemisphere of the capsule not being altogether opaque, but merely speckled, vision becomes clearer, from the light being better transmitted through the upper half of the cataract; but on motion of the eye, the contents of the capsule are again mingled together, and the vision becomes as obscure as before.

A still more remarkable improvement in vision occasionally takes place, in such cases, after simply puncturing the capsule with the cataract-needle, so as to allow the opaque fluid contained within it to escape. This fluid is speedily absorbed, and the light, transmitted through the transparent portions of the *cataracta fenestrata* which remains, is sometimes sufficient for a considerable share of vision.

Congenital cataract is generally met with in the capsulo-lenticular state. I believe it to be at first lenticular, and that after some months it becomes capsulo-lenticular.

In congenital cataract, the eyes are affected with perpetual oscillation; and the cornea and iris are not unfrequently smaller than natural.

Species 3. *Siliquose Capsulo-lenticular Cataract.*

Siliquose capsulo-lenticular cataract is met with in adults, but oftener in children, constituting in the latter one of the varieties of the congenital disease. In both, the chief characteristics are interrupted nutrition, and even diminution or entire absorption of the lens, with a shrivelled capsule. In the adult, a mere scale of lens remains, which is hence compared to a shrunk seed surrounded by a large withered husk. In the young subject, the lens is not unfrequently

completely absorbed, so that, by the age of 18 or 20 years, the two hemispheres of the capsule are in contact, so as to form an opaque, elastic, double membrane.

In adults, siliquose cataract is an occasional result of penetrating wounds of the capsule, through which the aqueous humour having been admitted, the exterior softer parts of the lens are dissolved, and the nucleus left.

Schmidt had observed this kind of cataract only in young persons, who, in childhood, had been affected with convulsions, during which he supposed rupture of the capsule to take place, and thus the aqueous humour to be admitted to the lens. Beer, however, met with it in children scarcely two months old, who had never suffered from convulsions.

I am inclined to believe, that any soft lenticular cataract, left to itself, is apt to degenerate first of all into capsulo-lenticular, the centre of the anterior hemisphere of the capsule becoming opaque and thickened, or numerous opaque spots forming in the capsule, and that then absorption of the lens may take place, so that merely a thin scale shall remain. This was the state in one eye of a lady, whose cataracts I had watched for 18 years. In her other eye, the lens was also reduced in thickness, but there was no capsular opacity. The disease had lasted for 25 years, before she submitted to an operation.

The opacity of a siliquose cataract in children, is generally of a light gray colour, rarely very white. The capsule is evidently corrugated, the cataract of small volume, and at a considerable distance behind the iris. Sometimes the iris is evidently retracted. In adults, again, this cataract is often very white, especially at any spot where the capsule has suffered from injury; elsewhere, it is dusky, or yellowish. It does not advance in a convex form, but appears flat.

Neither in children, nor in adults, is the iris affected in its motions, unless it is adherent to the capsule from inflammation.

In some congenital cases, we find the pupil widely dilated, and round the cataract the appearance of a black zone, the lens and capsule being so small, in consequence of impeded growth, as to drag into view the ciliary processes, and the space naturally existing between them and the circumference of the capsule. This state constitutes what has been called *cataracta cum zonula.*

Vision is sometimes completely lost, from the effects of the original cause on the retina; in other cases, distinct sensibility to light is retained, so that an operation may be had recourse to with a reasonable hope of success. The patient whose eyes are in the state of cataracta cum zonula, is often able to count the fingers, and distinguish colours.

Species 4. *Cystic Capsulo-lenticular Cataract.*

Cystic cataract is generally the result of a blow on the eye or edge of the orbit, sufficiently violent to separate, by its concussion,

the lens enclosed in its capsule, from the vitreous humour. In consequence of such an accident, the capsule and lens become opaque, and the lens dissolves.

The opacity is white, and nearly uniform; the opaque body is almost spherical, and presses against the circumference of the pupil. After a time, the vitreous humour dissolves, so that the cataract drops down, lies behind the lower edge of the pupil, and is seen bobbing about on every motion of the head. In this state, the disease is called *cataracta cystica tremulans vel natatilis.* The iris also becomes tremulous. Like a lens bursting through the capsule from a blow, and passing into the anterior chamber, the cystic cataract sometimes rolls forward through the pupil, and resting between the cornea and iris, induces inflammation of the latter.

Cystic cataract is rarely, if ever, unattended by amaurosis, so that if extraction is had recourse to, it is not so much with any hope of restoring vision, as merely to free the patient from the pain which is certain of being excited, if the cataract comes forward into the anterior chamber, and from the danger of sympathetic inflammation attacking the other eye. On extraction, the opaque capsule is sometimes found greatly thickened.

Species 5. *Bursal Capsulo-lenticular Cataract.*

One of the rarest kinds of cataract, consisting in capsulo-lenticular opacity, combined with the presence, within the capsule, of a small cyst filled with purulent matter, is styled *cataracta cum bursa ichorem continente.* The cyst has generally been found behind the lens, but occasionally in front of it.

The opacity is orange; the iris sluggish; the posterior chamber obliterated by the pressure of the over-distended capsule; the perception of light indistinct; the whole habit of the patient weak and cachectic.

Inflammation is the origin of bursal cataract, and probably traumatic inflammation in most cases.

CLASS II.—SPURIOUS CATARACTS.

GENUS I.—FIBRINOUS CATARACT.

An effusion of coagulable lymph, in consequence of inflammation of the iris and capsule, constitutes by far the most frequent kind of spurious cataract. It is in almost all cases attended by opacity of the anterior hemisphere of the capsule, and occasionally by capsulo-lenticular cataract. The effused lymph is met with in different states, and hence the distinctions which follow.

Species 1. *Flocculent Fibrinous Cataract.*

The opacity visible behind or within the pupil, is in the form of a fine net-work, surrounded by a misshapen, contracted, and partially or completely adherent pupil.

Vision is much impaired, although not always in proportion to the quantity of effused lymph; for sometimes when the pupil is small, and the spurious cataract considerable, a tolerable degree of sight is retained; while in other cases, although the pupil is large, and the net-work of lymph thin, the patient is almost totally blind, the inflammation in which these morbid changes had originated having probably extended to the retina.

Species 2. *Clotted Fibrinous Cataract.*

A clot of lymph, apparently unorganized, occupies the pupil, and sometimes even projects through it, so as to form a *cataracta pyramidata spuria*. The opacity is white; the pupil angular, and motionless; sensibility to light indistinct, or wanting. In most cases, the lymph is adherent to the capsule, which is also opaque and thickened; but occasionally the lymph is unadherent, and the capsule tolerably transparent.

Species 3. *Trabecular Fibrinous Cataract.*

In this variety of spurious cataract, the *cataracte barrée* of the French, the pupil is angular and narrowed, and behind it lies a capsulo-lenticular cataract, in front of which there is a stripe, or bar of lymph, running sometimes in one direction, sometimes in another. This substance is connected at each side with the edge of the pupil, but it does not cease there. Passing behind the iris, it attaches itself to that membrane, or to the ciliary processes. The bar varies in consistence, being sometimes cartilaginous, or even osseous.

The iris is motionless; the perception of light extremely indistinct, or wanting; and the eyeball not unfrequently atrophic.

GENUS II.—PURULENT CATARACT.

A spurious cataract, consisting in purulent matter, is much less frequent than one arising from a lymphatic effusion. In cases of neglected hypopium, the pus is after a time absorbed, and the pupil again brought into view. It sometimes happens, however, that the pupil is occupied by a spurious cataract, of a yellowish colour, which is nothing more than purulent matter, involved in the interstices of a web of fibrin. Vision, under such circumstances, is in general irretrievably lost.

GENUS III.—SANGUINEOUS CATARACT.

Like the last mentioned, this kind of spurious cataract has its basis in a fibrinous effusion, in the interstices of which, minute clots of red blood are observed to lodge, the blood-vessels of the iris or choroid having been ruptured by some previous injury, or during severe inflammation. Reasoning from what was observed in *Case* 249, we might expect sanguineous cataract sometimes to present a black colour.

The pupil is not so much contracted in this as in some of the

other kinds of spurious cataract, unless hypopium also has been present.

GENUS IV.—PIGMENTOUS CATARACT.

Portions of the delicate membrane which retains the pigmentum nigrum on the posterior surface of the iris, adhering, along with part of the pigment, to the capsule, constitute what is called pigmentous cataract. In some cases, this spurious cataract is the result of iritis, during the course of which, belladonna having been applied, while other remedies were probably neglected, the proper substance of the iris was forced to contract, leaving the membrane above referred to and the pigment, bound to the capsule by effused lymph. In other cases, a blow on the eye has the effect of detaching a portion of the same membrane, with some pigmentum nigrum, from the iris. Falling upon the capsule, they adhere to it, and the capsule afterwards becoming opaque, probably from the same cause which detached the pigmentum nigrum, this substance forms a striking contrast with the white ground upon which it is placed. In either of these sets of cases, the flakes of black pigment present somewhat of a leafy appearance, and hence the name *cataracta arborescens*, which Richter bestowed on this sort of spurious cataract.

The degree of vision is generally very limited, whether injury or iritis has been the cause.

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[1] Warnatz, in Ammon's Zeitschrift für die Ophthalmologie; Vol. iii. p. 295; Dresden, 1832.

[2] Consult Bech de Cataracta Centrali; Lipsiæ, 1830.

SECTION III.—VARIOUS ADDITIONAL CLASSIFICATIONS AND DISTINCTIONS OF CATARACT.

Cataracts are often classified, or at least distinguished, according to their consistence, size, colour, duration, and curability. Those who have carefully studied the classification of cataracts founded on the part or parts affected in each genus, can be at little loss in regard to these additional circumstances, which may therefore be dismissed in a few words.

§ 1. *Consistence.*

1. *Hard.* Only a lenticular cataract can be hard, but all lenticular cataracts are not possessed of this property, not even when they occur in persons far advanced in life. Very rarely do we meet with hard cataract in those under forty-five years of age. In an old person, the darker the gray or amber colour, and the smaller a lenticular cataract is, the harder it will be found. A hard lens is never white, its centre is darker than its circumference, its anterior surface appears flat, and it is never so large as to impede the free

motion of the pupil, or prevent a shadow from being thrown on it by the iris.

2. *Tough.* The capsule, or some substance effused into the posterior chamber, may possess the property of toughness. Cystic, siliquose, and trabecular cataracts are of this description. They are all more or less white.

3. *Soft.* Softness is a property which resides in the lens. In subjects about twenty-five, we find lenticular cataract soft and cohesive, so that although the needle passes freely through its substance, the fragments do not readily separate, at least on a first operation. After the aqueous humour is admitted into contact with such a cataract, it becomes more friable. The colour of a soft cataract is light-gray, or grayish-white. Not unfrequently, the soft lenticular cataract is stellated, from the division of the lens into triangular portions. During extraction, such a cataract is liable to fall into pieces.

4. *Fluid.* The capsule is generally opaque, when it contains a fluid, or dissolved lens. In some cases, the opacity and fluidity of the lens precede the opacity of the capsule; while in other cases, the diseased state of the capsule appears to lead to the disorganization and dissolution of the lens. The latter is probably the fact in ordinary cases of capsulo-lenticular cataract; while in congenital cases, the opacity of the capsule is certainly preceded by that of the lens. Fluid cataract is always white.

5. *Mixed.* The Morgagnian is an example of a mixed cataract; the capsule being tough, the lens hard or soft, according to the age of the patient, and the Morgagnian effusion fluid. The bursal cataract, and capsulo-lenticular cataracts in general, are also mixed.

These distinctions, founded on the consistence of cataracts, are important chiefly in reference to the choice of an operation for the cure of this disease.

§ 2. *Size.*

The hard lenticular cataract is small, as is also the siliquose cataract; the soft, fluid, and mixed cataracts, are generally large. The size is estimated by the presence or absence of aqueous humour in the posterior chamber, as indicated by the breadth of shadow thrown on the cataract by the iris, or the absence of such shadow.

§ 3. *Colour.*

The opacity of the lens, affected with cataract, is of a bluish-white, light-gray, amber, or brown colour, according to the age of the patient, and the nature of the disease. Green cataract is a complication of lenticular cataract with glaucoma. The bursal cataract is orange. Capsular cataract is always of a pearly or chalky white.

§ 4. *Duration and Development.*

In former times, the distinction of ripe and unripe cataracts was considered of great importance. It was supposed that cataract

depended on the coagulation of a fluid; and till this process was judged to be sufficiently advanced to permit of the cataract being displaced by the needle, the disease was deemed unripe.[1] If we are still to retain the terms ripe and unripe, we must employ them with a very different meaning. However small or soft a cataract may be, we may call it ripe, when it is completely developed, susceptible of no farther progress, or when it deprives the patient of the power of distinguishing objects; whereas, we may call it unripe, when it is not yet fully formed, when there is a suspicion that the opacity may make considerably farther progress, as is the case with posterior capsular, and central cataract, or when the patient still retains so much vision as to see the eyes of a person sitting before him, or distinguishes the different articles of furniture in a room. These may continue for years unripe for operation.

The distinctions of sudden and slow cataracts, and of those which exist from birth, or supervene at various periods of life, are not undeserving of attention. It must be observed, however, that congenital cataract is not always of the same sort, but may be capsular, lenticular, or capsulo-lenticular; and hence the impropriety of using the phrase *congenital cataract*, as if it were significant of any thing more than the date of the disease.

§ 5. *Curability.*

Pellier[2] introduced a practical or empirical distinction of three principal varieties of cataract; namely, the true, or curable; the mixed, or doubtful; and the false, or incurable. The *true*, or *curable*, was to be known by the pupil retaining its natural power of contracting and dilating in full perfection, while the patient was at the same time able to distinguish the light of a candle, or of any other luminous body, and even certain bright colours, such as red, green, &c. The *mixed*, or *doubtful*, was characterized by a feeble contraction and dilatation of the pupil, and the patient could scarcely distinguish light from darkness. Along with an opaque state of the lens, this variety was supposed to be attended with disease of the retina, or of some other part of the eye. In the *false*, or *incurable* cases, along with an opaque state of the lens, there was either a dilated or a contracted state of the pupil, the iris remaining immovable, whatever might be the degree of light to which the eyes were exposed, and the patient unable to distinguish between the most brilliant light and perfect darkness.

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1 'Expectandum igitur est donec jam non fluere, sed duritie quâdam concrevisse 'videatur.' Celsus de Re Medica; Lib. VII. Pars II. Cap. I. Sect. ii.

2 'Cours d'Opérations sur la Chirurgie des Yeux; Tome i. p. 172; Paris, 1789.

SECTION IV.—COMPLICATIONS OF CATARACT.

Cataract frequently presents itself along with other diseases of the eye, either purely local, or of constitutional origin; while in

other cases, it is complicated with constitutional diseases, which may or may not have been instrumental in producing the cataract itself. A perfectly uncomplicated case is rarely met with. The following questions must evidently be of the highest importance, in every instance. Is the organ of vision in a condition to resume its office to any useful extent, were the cataract removed? Is there nothing in the general health likely to frustrate the success of an operation, no local affection in any other organ of the body likely to sympathize with the eye and bring on inflammation?

1. As for purely local complications, I may mention those arising from inflammation of the cornea and iris, such as specks of the cornea, adhesion between the iris and cornea, or between the iris and the capsule. Such complications will readily be recognised, and will influence us in the choice of an operation, and in the mode of executing the particular operation we select. Ophthalmia tarsi, or chronic catarrhal ophthalmia, debars an operation, and especially extraction. Trichiasis or distichiasis, and inversion or eversion of the lids, must also be remedied, before any operation be attempted for the cure of cataract.

2. Some other local complications cannot easily, if at all, be discovered, except at the moment of operation; such as preternatural adhesion between the capsule and the lens, sufficient to prevent extraction from being accomplished, and a dissolved state of the vitreous humour, a complication scarcely less perplexing. The latter is a frequent attendant on glaucoma, and if the patient is known to have been glaucomatous before becoming the subject of cataract, we must be on our guard against a fluid vitreous humour; but in many instances nothing is known regarding the previous state of the eye, and there is no very manifest sign to lead us to a knowledge of the fact. Unnatural hardness of the eye, however, should lead us to suspect a dissolved state of the vitreous humour.

3. Such complications as the following are very unfavourable, yet not sufficiently so as absolutely to prevent us from operating; myosis, tremulous iris, slight varicosity, slight bogginess, preternatural firmness of the eyeball. In all of these cases, we may suspect, along with other morbid changes in the anterior of the eye, an imperfect sensibility of the retina, and that although the patient may recover a certain share of vision by the removal of the cataract, the improvement will be small and temporary.

4. If the pupil is dilated and fixed, and the patient unable to distinguish day from night, there can be no doubt that such a degree of amaurosis is present, as renders it quite needless to think of an operation. But we would not willingly operate, even in cases where a much less considerable degree of amaurosis was present, were we aware of the fact. The mere perception of the hand passing between the light and the eye, is by no means a sufficient index that the retina is free from amaurosis. The amaurosis, indeed, must be in the incomplete stage, if so much sensibility is retained; but if from the history of the case, and the appearances of the eye, there

is reason to dread that the retina retains merely the power of distinguishing light and shade, as it often does in incomplete amaurosis, it would be much better to let the patient alone, than to be raising in his mind false hopes of restoration to sight, subjecting him to the anxieties attendant on an operation, and exposing him to the troubles which are liable to follow, and which are sometimes severe and long-continued. For instance, if a patient, far advanced in life, discerns merely light and shade, and does not possess the natural degree of control over the muscles of the eyes, so that on being desired to look in any particular direction, he gazes in that direction with a movement of the whole head, but without any movement of the eyes, it is almost useless to operate.

5. I have sometimes operated for cataract on an eye affected with strabismus, but even when I have done this in children, in the expectation that the accession of vision consequent to the removal of the cataract would operate in curing the squint, I have been disappointed.

6. Fully developed glaucoma with cataract is readily recognised. The opacity is greenish; sometimes even sea-green, or olive-green. The cataract is voluminous, and, in some cases, seems still more so than it really is, from being pressed forwards by the diseased and superabundant vitreous humour. At last, the lens is pushed in some degree through the pupil. (See *Fig.* 52, page 483.) The iris is discoloured, and completely motionless. The pupil is generally dilated irregularly, the iris shrinking chiefly in one or two directions, so that the pupil becomes oblong or angular. The edge of the pupil appears to be rolled back into the posterior chamber. The eyeball feels as hard as a pebble. Its external blood-vessels, and often the internal ones also, are varicose. Internal flashes of light are frequently experienced by the patient, who is totally deprived of any power of perceiving light from without. Arthritic ophthalmia with severe and long-continued headach, is generally the precursor of this hopeless condition of the eye.

7. As for general and remote complications of cataract, the variety is endless. Among the most frequent are rheumatism, scrofula, gout, and syphilis, as general; and inveterate ulcers on the lower extremities, as remote complications. It is highly important to make ourselves acquainted with the existence of any such complications, and with the complete history of the health of the patient, who consults us on account of cataract. For instance, if an individual affected with cataract, be of an inflammatory tendency, subject, perhaps, to attacks of pneumonia or pleuritis, great care will be required, both before and after an operation, to avoid the causes of plethora and arterial action. It will probably be only by repeated blood-letting, and purging, with an abstemious diet, both before and after removing the cataract, that the eye will escape destructive inflammation.

SECTION V.—TREATMENT OF CATARACT WITHOUT OPERATION.

Three different modes of treating cataract without operation, have been proposed; viz. the *antiphlogistic*, the *stimulant*, and the *counter-irritant*. It may fairly be questioned, whether such means have ever succeeded in any case of true cataract, in restoring the natural transparency of the parts. Most of the alleged cures have, in all probability, been either instances of mere lymphatic effusions on the surface of the capsule,[1] or else cases of ruptured capsule, in which the removal of the opaque lens has been effected by the solvent power of the aqueous humour; while on other occasions, it is scarcely to be doubted, that no cataractous affection of the lens or its capsule existed, but that glaucoma, with incipient amaurosis, was mistaken for cataract, and submitted to certain modes of treatment, which not unfrequently prove efficacious in restoring, to a certain degree, the sensibility of the retina.

1. Blood-letting, and the use of mercury, are certainly likely to be attended with good effects, when inflammation is the cause of the opacity of the lens and capsule. The efficacy of these remedies, in incipient spurious cataracts, especially those of the fibrinous kind, is fully ascertained, but in true cataract they are seldom or never tried. Yet in certain cases of this sort they might perhaps prove beneficial; for instance, in the Morgagnian cataract, which, according to Beer, results chiefly from external irritation.

2. Mr Ware, in one of his notes to Wenzel's Treatise on Cataract, acknowledges himself "willing to hope, that means may hereafter be discovered, by which an opaque crystalline may be rendered transparent, without the performance of any operation whatsoever;" adding, that "the remedies which have appeared to him more effectual than others in these cases, have been the application to the eye itself of one or two drops of æther, once or twice in the course of the day; and occasional frictions of the eye, over the lid, with the point of the finger, first moistened with a weak volatile or mercurial liniment."

M. Gondret, to whom I shall have occasion to refer as recommending counter-irritation as a means of curing cataract, makes use also of stimulants to the eye, especially electricity or galvanism, and ammoniacal collyria. Magendie, who has published[2] a paper by M. Gondret, on the subject, regards the observations of this practitioner as illustrative of his own ingenious views of the influence of the fifth pair of nerves on the nutrition of the eye. When that nerve is cut across, the nutrition of the eye is interrupted, the cornea becomes opaque, and the humours are transformed into a substance resembling curd. As similar changes are found to arise when the nerve is unable from disease to execute its functions, it is by no means an unwarrantable conjecture, that cataract, which is generally admitted to be, in most instances, an effect of imperfect nutrition, may arise as often from a faulty action of the nerve which

controls the nutrition of the eye, as from any impediment directly affecting the nutrient vessels of the lens. If this be correct, then it is probable, that by stimulating, or otherwise modifying the action of the fifth nerve, the nutrition of the lens may be influenced; so that if want of nervous influence leads to opacity, excitation may remove the tendency to cataract, or even restore, in some cases, the natural transparency.

3. M. Gondret's paper, on the Treatment of Cataract, just referred to, contains a number of cases not undeserving of attention, although not one of them is a satisfactory instance of true cataract, cured by the means which he recommends. Sincipital cauterization, by means either of the actual cautery, or of an ointment formed with a highly concentrated solution of ammonia, is the remedy upon which he chiefly depends. I am not prepared to deny the efficacy of such powerful counter-irritation, in changing the diseased action upon which the production of true cataract depends, but in most of M. Gondret's cases, especially in those in which the opacity, visible behind the pupil, was preceded by inflammation, there is a suspicion that the disease was spurious.

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[1] Benvenuto Cellini tells Clement VII. that two cataracts had fallen upon his eyes. These were the effects of syphilitic iritis, of which Benvenuto cured himself by lignum vitæ. Memoirs of Benvenuto Cellini; Vol. i. Chap. xi.

[2] Journal de Physiologie; Tome v. p. 41; Paris, 1825.

SECTION VI.—PRELIMINARY QUESTIONS REGARDING THE REMOVAL OF CATARACT BY OPERATION.

Before entering on a description of the methods of operating for cataract, there are some questions of a general nature, which require to be considered.

1. When only one eye is affected with this disease, ought we to proceed to operate, or wait till the other eye also is attacked? Some tell us, that we ought not to operate under such circumstances, on account of the difference in visual power which would exist between the two eyes, even were the cataract successfully removed; a difference which, to a certain degree, could no doubt be remedied by the use of a double-convex lens, placed before the eye whence the cataract had been removed, but which, without this assistance, might render the patient's vision so confused, that to see well with either eye, the other would require to be shut. To delay, then, is the practice which is generally followed in such circumstances. But others recommend an immediate operation, asserting, that by removing the cataract from the one eye, the disease may be prevented from attacking the other; or that, if already commencing in this eye, it might be cured by external and internal remedies, if once the completely

cataractous eye were restored to its office by an operation. The sympathy which exists between the eyes is undoubtedly very strong, and we can easily conceive that it may operate in inducing similar affections of the crystalline lenses, as it often appears to do in producing similar diseases of the retinæ, and still less equivocally similar ophthalmiæ. Were it established that cataract was thus produced sympathetically, there could be no doubt of the propriety of removing a single cataract, even when not the slightest appearance of the disease could be detected in the opposite eye; but the fact is not established. Cataract in old people generally attacks both eyes within the period of a few months; but in middle life, we often meet with it in one eye, the other having continued unaffected for many years.

2. When both eyes are cataractous, and equally affected, ought both to be operated on at the same time? To this question, my experience leads me to answer in the affirmative, if division of the cataract is the operation to be performed; but if we mean to extract, I regard it as better to operate on one eye only, and wait the result, before touching the other. Double extraction decidedly exposes the eyes to greater risk of inflammation. If we operate only on one eye, and allow it to recover, we may possibly observe, in the course of the operation and recovery, some particulars which will be essentially useful to us in conducting the second operation, or will even lead us to select a different and more suitable mode of operating for the second eye.

3. Does the patient require to undergo any particular course of preparation, before submitting to an operation for cataract? The time was, when a long and severe preparation was deemed necessary, consisting of venesection, cupping and scarifying, purging, and low diet. Now-a-days, we have perhaps fallen into an opposite error, and avail ourselves too little of the precautions fitted to prevent inflammation. As it is of the highest importance that recovery should take place without inflammatory action, it may not be improper to bleed the patient once before operating, both to moderate the impetus of the circulation, and to discover by the appearances of the blood, whether there may not be inflammation already present in the system. Should the blood prove sizy, it would be highly imprudent to proceed immediately to an operation.

If the bowels be disordered, with foul tongue, deficient appetite, and headach, a dose of calomel every second or third night, followed by salts and senna next morning, ought to be given three or four times, or till the symptoms in question are removed. Even when the patient appears to be in perfect health, a few saline purges ought to be administered at proper intervals, and a strict antiphlogistic plan of diet followed for at least eight or ten days. Rest is to be observed for several days before any operation.

Immediately before the operation, the patient must take no full meal, and must carefully avoid all articles which are difficult of digestion.

When once an operation is resolved upon, it ought not to be put off without some good cause; for the patient's anxiety grows with every hour, and he is apt greatly to magnify the dangers to be apprehended. It proves highly encouraging to the patient, to talk with one who has been successfully operated on, and who is able to give a distinct account of the operation.

4. Is there any particular season of the year more suited than another for operating? The spring was formerly selected in preference to any other season. Yet from the prevalence of catarrhal, rheumatic, and inflammatory affections, at that period of the year, it is perhaps the worst. Patients who are liable to suffer from such complaints, ought to be operated on in dry summer weather only; but a purely local cataract, occurring in an individual otherwise healthy, may be removed at any season.

5. In cases of congenital cataract, ought the operation to be delayed till the patient has attained an age sufficient to enable him to understand the importance of an attempt to restore sight, or ought it to be practised during infancy? The answer decidedly is, Operate in infancy, and, if possible, before teething commences. If the operation is delayed, the capsule, becoming opaque, grows tough and coriaceous, and the eyes having no distinct perception of external objects, acquire such an inveterate habit of rolling, that for a long time after the pupil has been cleared by an operation, no voluntary effort can control this irregular motion. Speaking of the results of Mr Saunders' operations, Dr Farre states, that the sensibility of the eye, "in many of the cases cured at the ages of four years and under, could not be surpassed in children who had enjoyed vision from birth; but at eight years or even earlier, the sense was evidently less active; at 12, it was still more dull; and from the age of 15 and upwards, it was generally very imperfect, and sometimes the mere perception of light remained.[1]"

[1] Saunders' Treatise on some Practical Points relating to the Diseases of the Eye, p. 154; London, 1811.

SECTION VII.—POSITION OF THE PATIENT DURING OPERATIONS FOR CATARACT, AND MODES OF FIXING THE EYE.

In operations on the eye, much depends on the position of the patient, assistant, and operator, and on each understanding what he is to do. An ignorant forwardness on the part of the assistant, or a want of composure in the patient, may in an instant defeat the most perfect dexterity of the operator.

A clear and steady light is to be chosen, entering the apartment by the window near to which the patient is placed, and by no other.

Some operators place the patient on a chair, with an assistant

standing behind him; some lay him on his back on a table, and employ an assistant to take charge of one or other eyelid; others dispense with an assistant.

1. The patient being seated on a low stool, or on a chair without a back, leans his head against the breast of the assistant, who stands behind him. We shall suppose that the left eye is to be operated on. In this case, the patient is to turn his left side a little towards the window. With his hands he may lay hold of the seat, and he must be cautioned that on no account is he to raise them towards his eyes. If he cannot be depended on for this, an assistant at each side must watch his hands.

To the assistant is committed the double charge of preventing the head from bending suddenly back, and of supporting the upper lid. With his right hand he lays hold of the patient by the chin, while with the extremities of the index and middle fingers of his left hand applied upon the border of the upper lid, he raises it as completely as possible, presses it against the edge of the orbit, and thus exposes the upper part of the eyeball. He allows his fingers to project so far beyond the border of the lid, that should the patient raise the eyeball, it would come into contact with the fingers, and thus be, as it were, scared back into its proper position. In general, the assistant does not require to make pressure on the eye, in any stage of the operation.

The operator sits before and close to the patient, on a seat of such height that the patient's head is opposite to the breast of the operator, who, by this means, is able to observe with ease whatever goes on in the eye, and is not obliged to elevate his arms too much during the operation. The operator now tries the point of the needle or knife, by passing it through a bit of very thin leather, held on the stretch. If it produces no sound on piercing the leather, the point is good. Still supposing that it is the left eye which is to be operated on, he takes the instrument in his right hand, while with the index-finger of his left, he draws down the lower lid, and places the point of that finger upon the border of the lid, so as just to touch the eyeball. The middle finger he places on the caruncula lacrymalis, allowing it at the same time to touch the nasal side of the eyeball, so as to steady it, and prevent it from turning, as it is very apt to do, towards the nose, a position, which, if assumed after the operation has commenced, may be productive of serious mischief.

By the fingers of the assistant and the operator, placed as has been now explained, the eye is fixed, yet without pressure. To whatever side it turns, it meets with the point of a finger, except towards the temple, where the needle or the knife is about to enter.

Various sorts of specula, spikes, and hooks, have been invented for fixing the eye; but all of them, except Adams' speculum, which is a thick piece of silver, with a concave edge, and the bent silver wire, commonly called Pellier's speculum, are now discarded. One or other of these is occasionally employed, especially in operations

on children, for supporting the upper lid, being applied either to its outer surface, or introduced beneath its edge.

If it is the right eye which is to be operated on, the patient turns his right side a little towards the window, the assistant places his left hand on the chin, and with his right raises the upper eyelid, while the operator takes the needle or knife in his left hand.

2. Some operators prefer in all cases, that the patient be laid along upon a table; alleging as one reason for recommending this position, that it is found greatly more convenient, if the patient should grow faint during the operation. When the horizontal position is adopted, and the operator is ambidextrous, he sits or stands at the end of the table, and behind the head of the patient, supporting the right upper eyelid with the forefinger of the left hand, placing the middle finger on the caruncula lacrymalis, and holding the instrument in his right hand, while the assistant, standing by the patient's side, depresses the lower lid. When the left eye is to be operated on, the surgeon takes the instrument into his left hand, and raises the upper eyelid with his right. The patient should be so placed that the eye to be operated on is next the window. If the operator prefers operating with his right hand on the left eye, he stands by the patient's left side, and depresses the lower eyelid with his left hand, while the assistant sitting or standing behind the patient raises the upper lid.

3. Some operators employ no assistant. The patient being seated on a low chair, the back of which is furnished with a hollow cushion, upon which to rest the head, which is bent a good deal back, the surgeon stands behind him. With the index and middle-finger of the hand which does not hold the knife, placed upon the upper and lower eyelids towards their nasal extremity, he presses them against the upper and lower edge of the orbit, keeps them open, and fixes the eye. If not ambidextrous, he operates thus only on the right eye; when he operates on the left eye, he stands by the patient's left side, and separates the lids by means of the index-finger and thumb of the left hand. The same method of fixing the lids may be adopted with the patient laid on a table.

It is only for those who are experienced and dexterous to attempt operating without an assistant, and even with them the practice does not always answer. If the fingers of the hand which does not hold the knife be occupied in keeping the eyelids asunder, it may be impossible for the unaided operator to prevent the turning of the eye towards the nose.[1]

If with the eye which is not to be operated on, the patient retains any considerable degree of vision, I generally tie the eye up, that both eyes may be more at rest during the operation. There is no better mode, however, of fixing the eyes, than by desiring the patient to look at the operator, who seizes that moment for entering the instrument into the eye, which is the subject of the operation. Of this advantage we are not so certain, if the other eye is tied up.

[1] See an account of an operation by Barth, in Santerelli, Delle Cateratte, p. 61; Forli, 1811.

SECTION VIII.—GENERAL ACCOUNT OF THE OPERATIONS FOR CATARACT.

There are three kinds of operation for the cure of cataract. All three have undergone innumerable modifications, but each is founded on a principle totally different from that of the others.

1. There is the mere removal of the cataract out of the axis of vision, leaving it still in the eye. This was formerly called *Couching*, but is now termed *Displacement.*

2. We have the complete *Extraction* of the cataract.

3. There is the *Division* of the cataract into fragments, which are dissolved by the aqueous humour.

It is possible to perform each of these three kinds of operation, either through the cornea or through the sclerotica.

The instruments invented for the performance of the operations for cataract are infinitely various, almost every operator, and in many instances those who have operated little or none, having modified the old or invented new ones. The simpler and the fewer the instruments are, the better. If the young oculist attach himself to the simplest modes of operating, and acquire dexterity and skill in their performance, he will think little of the complicated contrivances with which some have tried to make up for their want of knowledge, and their deficiency in mechanical adroitness.

I. In *Displacement*, of which there are two varieties, viz. *Depression* and *Reclination*, we assign a new situation to the cataract, at the expense of the vitreous humour, which we know to be by no means a mere gelatinous mass, but an organized part, supplied with blood-vessels, and these derived from the same artery which nourishes the retina. We conclude, then, that extensively to lacerate the hyaloid membrane, as must be done in forcing down into the vitreous humour such a body as the lens, is likely to produce serious injury to the internal textures of the eye, excite inflammation, disorganize the vitreous humour, and lead to insensibility of the retina. The displaced lens, also, is apt to come into contact with the ciliary processes, and to excite iritis, followed by closure of the pupil; or to press against the retina, which must necessarily cause amaurosis. These effects may follow more or less quickly. If the displaced lens is firm and entire, or enclosed within the capsule, it will not dissolve in the vitreous humour, but remain as a permanent cause of irritation and chronic inflammation, likely to end in amaurosis.

In *Depression*, the lens is pushed directly below the level of the pupil. It will follow, of course, the curvature of the eye, sweeping over the corpus ciliare towards the anterior edge of the retina, and resting in such a position, that its anterior surface shall still be directed forwards, and a little downwards. If the lens is hard, and the depression rudely performed, the retina, and even the choroid, may readily be lacerated in the operation, and the eye deprived in an instant of all chance of recovering the power of sight. If the

lens is left resting upon the retina, it is reasonable to conclude, that this of itself will prevent vision. Should it become loosened from its new situation, and rise a little from the retina, the sensibility of this membrane may perhaps return; but in other cases, even after the pressure is thus removed, the amaurosis may continue.

After depression, the lens is very partially covered by vitreous humour, by the elasticity of which, if this part be healthy, it is apt to be pushed up, and thus to resume its original situation, forming as at first an impediment to vision, and again requiring to be displaced. If the vitreous humour is dissolved, the lens will gravitate to the bottom of the eye.

Re-ascension of the cataract is not so apt to occur after *Reclination*. In this operation, the lens is made to turn over towards the bottom of the vitreous humour, in such a way that the surface of the lens, which formerly was directed forwards, now looks upwards, and what was the upper edge is turned backwards. Over the lens, displaced in this manner, the vitreous humour closes more completely than over the depressed lens, so that re-ascension is less likely to happen.

Another advantage of reclination is, that the retina is not so liable to be pressed on by the cataract, as after depression, the displacement effected by the former operation, carrying the lens completely below the level of the pupil, leaving it there in the vitreous humour, but not pressing it into contact with the floor of the eyeball.

On the other hand, reclination must necessarily break through and destroy the hyaloid membrane more extensively than depression; while after the former, as after the latter operation, the cataract will certainly often remain, like a foreign body, the cause of continued irritation within the eye, and of ultimate insensibility to light.

II. *Extraction* is a removal of the cataract out of the eye at once, and if easy of performance, and not very dangerous for the eye, we would without hesitation pronounce it the operation which ought to be preferred. But, to perform this operation, whether through the cornea or sclerotica, requires no small degree of dexterity, and is attended by very considerable danger to the eye.

If the cornea is chosen as the part to be opened for the extraction of the cataract, the incision, in order that it may unite without inflammation, and without any cicatrice which would prevent the entrance of light, must be an exact segment of a circle, regular and smooth, at a fixed distance from the sclerotica, and of sufficient size to allow the easy exit of the cataract. Both in making the section of the cornea, which is the first period of the operation, and in the subsequent one of opening the capsule, the iris ought to be left uninjured. One of the chief dangers attached to extraction is the loss of vitreous humour. The hyaloid membrane, if not perfectly sound, is apt to burst, and the vitreous humour to be ejected from the eye, either before, along with, or after the opaque lens. There remains, after the most favourable extraction, an extensive wound of the cornea, which we are most anxious should close by the first

intention, and without any protrusion of the iris. The latter event, one of the most unfortunate which can happen, appears in some cases to be the consequence, and is always an additional cause, of inflammation. Occasionally violent suppurative inflammation attacks the eye after extraction, so that the natural structure of the organ is totally changed. In less severe cases, the iris suffers in texture, the pupil closes, or the cornea is rendered opaque.

The operation of extraction through the cornea, is too artificial a piece of surgery to be trusted to the hands of those who have not made themselves masters of the subject, and already shown a certain share of natural or acquired dexterity in operating on the eye. It is too nice and dangerous an operation to be undertaken without the utmost precaution, composure, and steadiness.

Nor is it likely that extraction through the sclerotica is less difficult or less dangerous. Indeed, this method appears to be universally abandoned, as exposing the eye to the almost certain loss of a large quantity of vitreous humour, and consequent destruction of the organ. If the risk is so great, it must deter us from this mode of operating, even although it possesses the advantage of leaving the cornea untouched.

III. *Division* is founded on the fact that the aqueous humour, acting as a menstruum perpetually absorbed and secreted, has the power of completely dissolving and removing the crystalline lens. Reasoning from this fact, and from the anatomy of the parts concerned, we naturally conclude that it will be easy to introduce a needle either through the cornea, or through the sclerotica, open up the anterior hemisphere of the capsule, so as to admit the aqueous humour, and thus procure the solution of the cataract. Accordingly, division is regarded as the least dangerous mode of curing cataract by operation. It is not exempt, however, from disadvantages, trifling ones, indeed, when compared to the dangers attendant on displacement or extraction. The torn capsule is apt to re-unite, so that the aqueous humour is excluded from the cataract, and the solution ceases. In such a case, the operation must be repeated, the lens itself divided, and the fragments brought into the anterior chamber. Iritis is not an unfrequent consequence of the operation of division, and is apt to be attended by opacity of the capsule from inflammation. This may take place even when the iritis is slight; and as the capsule is insoluble, there is no way of removing its opaque shreds from behind the pupil, except by displacement or extraction. Rudely performed, division, by injuring the nutrient vessels of the vitreous humour, induces dissolution of the hyaloid membrane, the effects of which being propagated to the retina bring on amaurosis. If the cataract is hard, division is impracticable; but in subjects about middle life, and still more in young persons and children, this method is not merely sufficient for the cure of the disease, but is plainly the operation to be preferred.

The conclusions to be drawn, from a general review of the opera-

tions for cataract, are, that each possesses advantages and disadvantages, and is attended by peculiar dangers, that one mode of operating will be suitable for one case of cataract, and another for another, and that there can be no more incontestible proof of a man's ignorance of this subject than his asking which of the operations we practise, or of a man's being a charlatan than his pretending to cure all kinds of cataract by one kind of operation alone, modified by some trifling change in the manipulations, or the instruments. Each of the operations for cataract will, in certain circumstances, recommend itself to our choice: none is to be universally adopted, and practised to the entire rejection of the others.

SECTION IX.—DEPRESSION AND RECLINATION.

In *depression*, the cataract is pressed down by the needle below the level of the pupil, somewhat into the vitreous humour, and to such a depth as no longer to form an obstacle to vision. This operation, although by no means the best, is certainly one of the simplest, as it is the most ancient, and therefore claims to be first described.

If we examine the figure of the eye, and the proportions of its several parts, it will be evident, that there is not sufficient room for the lodgement of a lens of the natural size directly below the pupil. If merely depressed, without being reclined or turned over, the lens will not be sufficiently covered by the vitreous humour, and will be very apt to re-ascend into its original situation. If pressed too much down, it will be lodged upon the ciliary processes and retina, or will be thrust between the retina and the choroid, or even through these membranes,[1] causing excessive pain at the moment of the displacement, pain which has in some instances been known to last through life; inducing vomiting some hours after the operation, scarcely to be calmed; and bringing on inflammation, and amaurosis. These appear to be the unavoidable effects of incautiously depressing a large lens. They are carefully to be distinguished from other bad effects which are apt to attend this operation, but which with attention may be avoided; namely, wounding of the ciliary processes, the retina, or the iridal artery, at the moment of entering the needle into the eye.

The frequent complaints made against the operation of depression led Willburg[2] to propose that modification of displacement known by the name of *reclination*. In this operation the needle being applied, not to the upper edge but to the anterior surface of the lens, or rather of the capsule, the cataract is pressed backwards and downwards into the lower part of the vitreous humour, opposite to the interval between the external and inferior straight muscles,

and is left with its anterior surface directed upwards, its superior edge backwards. This operation must necessarily be attended with much disturbance of the vitreous humour; yet it is in a great measure free from the principal objections against depression. Even a large cataract, which has been reclined, may lie embedded in the vitreous humour, without being in contact with any other part of the eye, and consequently without pressing directly against the retina or the corpus ciliare. It will also be so impacted in the vitreous humour that it will not be likely to re-ascend.

§ 1. *Depression or Reclination through the Cornea.*

In depression and reclination, the needle is generally introduced through the sclerotica and choroid. Some, however, have preferred passing it through the cornea, but in this way neither operation can be satisfactorily performed. If reclination be attempted through the cornea, it is almost impossible to separate the lower edge of the capsule from its natural connexions, even although the pupil is fully dilated by belladonna. The cataract, therefore, will not be put quite out of sight, and will be very apt to re-ascend. If the operator, observing the reclination but imperfectly effected, makes farther attempts to displace the cataract, he will probably bruise and perhaps lacerate the iris, so as to excite severe inflammation. When partial adhesions exist between the iris and capsule, requiring to be separated before proceeding to displacement of the cataract, the separation can with difficulty be effected by the needle passed through the cornea.

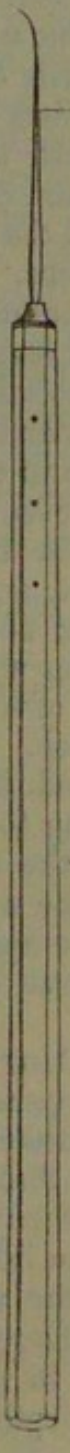

Fig. 70.

§ 2. *Depression or Reclination through the Sclerotica.*

On the evening previous to the operation, extract of belladonna, moistened to the consistence of cream, is to be smeared on the eyebrow and eyelids, and allowed to remain till about half an hour before the operation, when it is to be washed off with a sponge and tepid water. If the pupil is not by this time fully dilated, a little filtered solution of extract of belladonna in water is to be dropped upon the conjunctiva, not rudely dashed in with a hair pencil.

The instrument best adapted for depression and reclination is a bent needle, of which *Fig.* 70 is a lateral view, the curved part measuring not more than $\frac{1}{5}$th of an inch in length, nor more than $\frac{1}{20}$th of an inch in breadth at its broadest part.

The neck should be perfectly round, so that after the instrument is introduced into the eye, it may be turned in any direction without distorting or enlarging the aperture by which it has been passed through the sclerotica and choroid.

Depression and reclination are divided each into four periods, which must not only be distinctly understood by the surgeon, but carefully observed by him in practice. In the *first* period, the needle is introduced through the tunics, and into the vitreous humour. In the *second*, the posterior hemisphere of the capsule is divided. In the *third*, the anterior hemisphere of the capsule is divided. In the *fourth*, the actual displacement is effected. It is only in the fourth period, that reclination differs from depression.

1*st Period.* The needle must enter the eye so as to wound nothing but what cannot be avoided, else we may be prevented from satisfactorily executing the remaining parts of the operation, or may inflict serious and irreparable injury.

The parts which must be wounded are the conjunctiva, sclerotica, choroid, and vitreous humour. The parts to be avoided are the ciliary processes, the retina, the branches of the iridal or long ciliary artery, and the lens. The vessels of the choroid are also to be spared as much as possible. If the ciliary processes, the branches of the iridal artery, or several of the choroidal arteries be wounded, hæmorrhagy is likely to take place into the eye, the blood collecting between the sclerotica and choroid. We are taught to believe that the retina is insensible to mechanical irritation, so that the wounding of it with the needle should not be productive of any pain; but as we know not how far the violent vomiting which not unfrequently follows displacement, may sometimes be owing to touching the retina with the needle, or how far its sentient power may afterwards be affected from being wounded, we should always avoid a part of the eye, the integrity of which it is reasonable to conclude, must be of the highest importance. If the needle is directed towards the cataract in the first period, it is apt to enter the substance of the lens, so that on attempting to proceed with the operation, the whole cataract moves towards the pupil; an inconvenient and awkward occurrence, requiring the needle to be withdrawn a little and freed from the lens, before the operation can be proceeded with.

All these errors may be avoided by attending to the following rules.

1. Taking the needle in his right hand, if it is the left eye which is to be operated on, and *vice versâ*, the operator holds it with the convex surface looking upwards and the concave surface downwards, in order that in passing through the pars nonplicata of the corpus ciliare, it may divide as few of the choroidal arteries as possible.

2. The lids being fixed by the fingers of the assistant and operator, in the manner specified at page 665, the operator leans with his little finger on the cheek of the patient as on a point of support, in order to prevent the needle from sinking suddenly and to too great a depth into the eye.

3. The point of the instrument is to be directed towards the centre of the vitreous humour, thus completely avoiding the lens.

4. The needle is to be entered at the distance of one-sixth of an inch behind the temporal edge of the cornea. If this rule is not attended to, but the instrument is entered either much nearer to the cornea or much farther from it, the ciliary processes on the one hand, and on the other the retina, can scarcely escape being injured.

5. As the iridal artery divides into two branches, at the distance of three lines from the edge of the cornea, in order to avoid these branches, the needle is to be entered exactly in the equator of the eye.

6. As soon as the needle has penetrated to the depth of one-fifth of an inch, or in other words, as soon as the lance-shaped part of it is fairly within the choroid, the first period of the operation is completed.

2d Period. The second period of the operation commences with a double motion of the needle, by which, in the first place, it is made to perform a quarter of a revolution on its axis, so that its concave surface comes to be turned forwards and its convex surface backwards, while at the same time its handle is carried a little towards the temple, and its point forwards and inwards to the back of the lens. The extent to which it will require to be introduced, in order to reach the centre of the posterior surface of the lens, is shown at *a*, *Fig.* 70, and it is well to mark this length on the needle with a groove, so that the operator may know when the instrument is pushed sufficiently into the eye. The point of the needle is now to be raised to the middle of the upper edge of the posterior hemisphere of the capsule, and by a repeated vertical movement of the instrument, the posterior hemisphere is to be divided.

3d Period. As soon as the surgeon considers the division of the posterior hemisphere of the capsule to be accomplished, he brings the needle slowly from under the lower edge of the crystalline body,

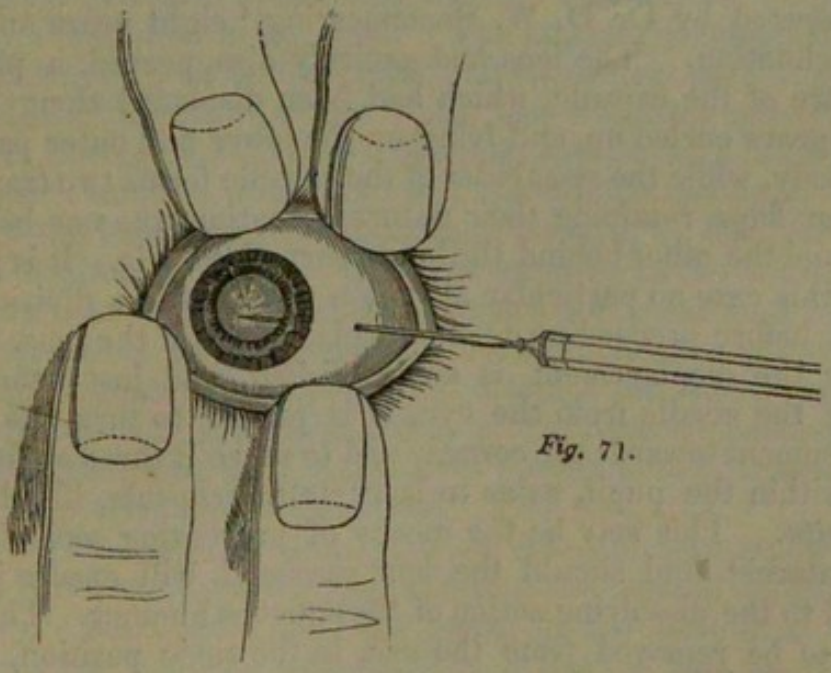

Fig. 71.

into the posterior chamber. (*Fig.* 71.) He turns the point of the needle

towards the anterior hemisphere of the capsule, and by a repeated vertical movement of the instrument, he next divides that membrane, in its whole extent.

4th Period. The rest of the operation, differs according as the cataract is to be depressed or reclined.

If the operator chooses to depress, he elevates the point of the needle by lowering its handle, till the point reaches the superior edge of the lens, and then he applies its concave side to the vertex of the cataract. The handle is now to be gradually elevated, and the point depressed; the cataract descends from behind the pupil; its course is downwards, and a little outwards and backwards; it is to be depressed till it is no longer in sight. If, in effecting this, the handle is raised much higher than the horizontal position, the cataract is pressed through the retina, and vision extinguished by the very attempt which is made to restore it.

For the space of a minute or two, the needle is to be kept in contact with the depressed cataract.[3] Its point is then to be gently raised, the operator taking notice whether the cataract reascends, or remains depressed. If it reascends, the depression must be repeated.

In this operation, and also in reclination, it, no doubt, would be desirable that the capsule should be displaced along with the opaque lens; but as this is not easily accomplished, we content ourselves with dividing it, leaving its shreds attached, through the medium of the zonula Zinnii, to the ciliary processes. These shreds, being highly elastic, will generally roll themselves up, and prove no impediment to vision, unless inflammation come on and render them opaque, in which case they will form a secondary capsular cataract. *Figure* 72 shows the interior of an eye, dissected by Dr D. W. Soemmerring,[4] eight years and a half after reclination. The lens had entirely disappeared, a portion of the centre of the capsule, which had been displaced along with the lens, appears curled up, and lying on the lower and outer part of the ciliary body, while the remainder of the capsule forms two transparent semilunar flaps, retaining their natural situation, the one behind the upper, and the other behind the lower part of the iris. It is probable that in this case no particular attention was paid to a division of the capsule, before proceeding to the displacement of the lens.

Fig. 72.

After the displacement is accomplished, and just before withdrawing the needle from the eye, it is proper to turn the point of the instrument towards the cornea, and to move it three or four times round within the pupil, so as to lacerate the capsule, if it had been left *in situ*. This may be the means of preventing secondary capsular cataract, and should the lens reascend, will ensure its being exposed to the dissolving action of the aqueous humour. The needle is then to be removed from the eye, in the same position, as to its surfaces, in which it was introduced.

If the surgeon prefers reclination to depression, he commences the fourth period of the operation by raising the point of the needle not more than the tenth of an inch above the transverse diameter of the lens; he turns its concave surface backwards, and then immediately proceeds to recline the cataract, by moving the handle of the instrument upwards and forwards, while its point, of course, passes downwards and backwards. By this manipulation, the cataract is made to fall backwards into the vitreous humour, and at the same time downwards and a little outwards. The position of the needle at the end of reclination, is very different from its position at the end of depression. In the latter, it is nearly horizontal; in the former, the handle is pointing upwards, outwards, and forwards, nearly in a line with the temple of the operator.

Manner of using the needle. 1. This instrument is to be held very lightly in the hand, so that it may be moved easily in all directions. If it be grasped firmly by the fingers, the operator has comparatively no power over it, and is unable to execute the delicate movements required in the operations of displacement.

2. When once the needle is introduced into the eye, no part of the depression or reclination is to be executed by a motion of the whole instrument in one direction; but the point is always to be moved in one direction, and the handle in another, so that the needle forms a lever of the first kind, the sclerotica being the fulcrum. Upon this fulcrum, the instrument ought to be moved with the least degree of pressure possible, and without any dragging of the eye.

Modifications of depression and reclination according to varieties of cataract. 1. When the cataractous lens is friable, and breaks into fragments under the pressure of the needle, or when soft, so that the needle passes through it, displacement ought to be altogether, or in a great measure, abandoned, and the operation of division immediately substituted in its room. The anterior hemisphere of the capsule is carefully to be lacerated, and its central part, if possible, destroyed; the fragments of the friable lens will often pass almost of themselves through the lacerated opening, and through the pupil into the anterior chamber, where they will speedily be dissolved. If the nucleus of the lens, however, appears to be hard, we have our choice either to displace it, or leave it *in situ*, exposed to the action of the aqueous humour. The pieces into which a soft gelatinous lens may be divided, are not so easily scattered by the application of the needle; and in such a case, it is better not to attempt too much, but rather confine ourselves to the comminution of the anterior hemisphere of the capsule, reserving for a subsequent operation the division of the lens and dispersion of its fragments.

2. If displacement be attempted in cases of capsulo-lenticular cataract, it not unfrequently happens that the instant the capsule is opened with the needle, the lens being in the state of a fluid, is poured into the aqueous humour. In a day or two, the aqueous

humour will again be of its natural transparency, the fluid lens having been absorbed; but unless something more has been done at the time of the operation than merely puncturing the capsule, vision will still be interrupted by the capsular part of the cataract. When we observe, therefore, that the dissolved lens is escaping into the aqueous humour, we should endeavour as completely as this state of matters will allow, to lacerate and destroy the anterior hemisphere of the capsule; and should we find after the absorption of the dissolved lens is effected, that the central aperture in the capsule is insufficient, either another attempt must be made with the needle, to clear away as much of the opaque membrane as shall secure the transmission of the rays of light to the retina, or the capsule must be extracted through a small incision of the cornea.

3. We sometimes have to do with cases of cataract, in which the edge of the pupil, in consequence of previous iritis, is partially or completely adherent to the capsule. When the adhesion embraces the whole circumference of the pupil, to separate the capsule is almost impossible,[5] so that as far as the capsule is concerned, the formation of a central opening in it is all that we should attempt. The lens we displace or divide, according to the estimate we are led to form of its consistence. When the edge of the pupil, on the other hand, is bound to the capsule in one or two points only, as will be rendered evident on bringing the iris under the influence of belladonna, we endeavour first of all to cut across the adhesions with the edge of the needle, then open up the centre of the capsule, and lastly displace the opaque lens. Before withdrawing the needle, the central aperture of the capsule may be enlarged or completed, unless we judge that enough has already been done, and that any thing farther should be left to another operation, after an interval of some weeks or months. The cutting across of the adhesions between the iris and the capsule, is generally attended with some discharge of blood.

4. Cases occur in which the cataractous lens instantly re-ascends, whenever the needle is raised in order to be withdrawn from the eye. Such an occurrence has been ascribed to a greater degree of adhesion than is natural between the lens and capsule, or between the capsule and the hyaloid membrane, and has been designated *elastic cataract*. In this case, we allow the lens to resume the situation whence it had been forced by the application of the needle; we then carry the instrument over its upper edge, and down behind the posterior hemisphere of the capsule; we move it upwards and downwards, so as to destroy the adhesion of the capsule to the hyaloid membrane, bring up the needle from under the cataract into the posterior chamber, and then repeat the displacement as before.

After-treatment. 1. Experiments on the degree of vision, recovered by means of the operation, which has just been performed, are not advisable, as in the endeavours which the patient makes to discover the objects presented to him, the muscles of the eye are necessarily

called into action, and this is apt to be followed by re-ascension of the cataract.

2. The eyes are to be shaded by means of a light linen compress, fixed by a roller going round the head, or pinned to the night-cap.

3. Rest is to be enjoined, both of the eyes and of the head, for some days; the patient lying in bed, or sitting in a chair. The room is to be kept moderately dark. The food is to be of an easily digested kind, not too nourishing, nor of such a sort as to require chewing.

4. After three or four days, the eyes may be protected from the light by a green bonnet-shade, but ought not for eight or ten days longer to be employed in examining objects. After this period, they are gradually to be brought into use, the patient taking care to avoid whatever excites pain or redness of the eyes, or gives rise to epiphora.

Accidents during or consequent to the operations of displacement.

1. One of the least considerable of the accidents which are apt to follow these operations, is the formation of a small thrombus under the conjunctiva, in consequence of one of the visible vessels of the eye having been wounded by the needle, a thing which may easily be avoided. Should such a thrombus follow, it is to be left to itself; the blood contained in it will speedily be absorbed.

2. A small fungous excrescence sometimes rises from the wound made by the entrance of the needle through the coats of the eye. It may be touched once a-day with a solution of nitrate of silver, or if this proves ineffectual, with the same substance in the solid state.

3. Effusion of blood into the chambers of the eye is by no means a frequent occurrence in the operations of displacement. Even when the iridal artery is divided, or the ciliary processes touched, the bleeding generally tends more to escape by the wound than to flow into the interior of the eye. At the same time, it cannot be denied that hæmorrhagy into the aqueous humour, suddenly obscuring the field of operation, does occasionally occur. In the majority of cases, the blood may safely be left to be removed by absorption. Rarely indeed is it in such quantity as to produce a feeling of pain or distention, or render necessary an opening at the edge of the cornea, with the extraction-knife, for its evacuation.

4. If the operator has either entered the needle in a wrong direction, or plunged it too deep into the eye at first, the point of the instrument is apt to be buried in the substance of the lens, so that on attempting to proceed with the operation, the whole cataract moves forward towards the cornea. When the operator observes that this is the case, he must turn the needle several times round on its axis, and withdraw it a little, so as to free it from the lens, and then proceed to the second period of the operation, in the usual manner.

5. It can happen only from extreme carelessness, or rudeness of manipulation, that in introducing the needle into the posterior chamber, the iris is separated from the choroid, an accident which

is attended by considerable discharge of blood into the aqueous humour. In this case, it is proper to withdraw the needle and postpone the operation. The iris if healthy, is not likely to return to its place, but a false pupil will probably remain permanently.

6. It sometimes happens, that on attempting to depress or recline the lens, it is suddenly tilted forward through the pupil. When this is the case, it may be possible with some difficulty, to carry it back again to its former situation, and then to displace it as had been intended. I consider it to be better practice, however, immediately to extract the lens. For this purpose, the operator should make a section of one-third of the circumference of the cornea with the extraction-knife, and laying hold of the lens with a hook, remove it from the eye.

7. Violent bilious vomiting in the course of a few hours, or during the first night after the operation, is a frequent consequence of depression and reclination. This symptom has been attributed to various causes, as injury of the ciliary nerves, or of the retina, at the moment of entering the needle, and pressure on the retina, or laceration of it, from displacement rudely and ignorantly performed. The ordinary means for checking vomiting are to be adopted, especially small laudanum clysters, frequently repeated. Blood-letting ought also to be had recourse to, as inflammation scarcely ever fails to occur in those cases where violent vomiting is excited by the operation.

8. Adhesion of the lids in the morning is a usual occurrence after any operation with the needle. It is of no consequence, and is to be preferred to an acrid watery discharge, or hot dry eye.

9. Inflammation of the retina and of the iris is to be apprehended after the operations of displacement, especially when the manipulations have been rudely executed, the zonula Zinnii separated from its adhesion to the ciliary processes, and the needle kept long in the eye. Severe pain in the eye and round the orbit, coming on during the night, is generally the first symptom indicative of internal inflammation, after any operation on the eye. The sclerotica and conjunctiva become red, the colour of the iris changes, the pupil contracts, lymph is effused, the remnants of the loose capsule coalesce, and become opaque, vision is extremely indistinct, and unless proper means of cure are adopted, onyx, hypopium, and destruction of the eye, may ensue. Free blood-letting, both general and local; opium, internally and externally; calomel, so as speedily to affect the mouth; and belladonna, to dilate the pupil, are the remedies chiefly to be relied on.

Chronic inflammation of the internal textures of the eye is a frequent consequence of depression or reclination. It is not attended by much pain, but prevents the eye from ever attaining a degree of healthiness sufficient to render it useful. The patient perhaps retains a considerable degree of recovered sight for some weeks after the operation, but epiphora, varicose dilatation of the external blood-vessels of the eye, and in general a contracted, but sometimes a

dilated pupil supervening, the sight becomes weak, and in a few months is extinguished. The true remedy for this state of the organ would be the entire removal of the lens, which, lying in the vitreous humour, operates exactly as a foreign substance would do in the same situation.

10. Amaurosis, with dissolution of the vitreous humour, irregularly dilated pupil, haziness of the cornea, and varicose dilatation of the external blood-vessels of the eye, is a common result of the operations of displacement. If the retina is pressed upon by a firm lens, which has been depressed or reclined, insensibility to light is the necessary consequence. It sometimes happens, however, that after some days or weeks, the lens rises a little in the vitreous humour, the retina is thereby relieved, and the power of vision returns. Yet this result does not always follow; the lens may re-ascend, and the retina remain insensible. If the practitioner who has performed depression or reclination, sees reason to suspect that the very means which he had adopted for restoring vision, threaten to destroy it, he ought not to hesitate about withdrawing the displaced lens from the eye entirely. Introducing a bent needle through the sclerotica, the cataract is to be raised into its former situation, pressed forward through the pupil, and kept in contact with the cornea till a section is made, a hook introduced, and the lens laid hold of, so that it may be extracted.

11. If a lens, of moderate consistence, is stript of its capsule, and depressed or reclined, it may dissolve partially or entirely in the vitreous humour.[6] But if it be displaced, with its capsule entire, it will suffer no solution; even stript of the capsule, a hard lens may remain unchanged for a great length of time. *Figure* 73 shows the interior of the eye of a woman, of 73 years of age, in which the lens, along with its capsule, was reclined by Dr Emden. The cataract re-ascended, and three months after the first operation, the reclination was repeated. A segment of the cataract always continued visible behind the pupil, notwithstanding which the patient saw well for three years, when she died. The lens, contained in its capsule, was found entire, in the situation represented in the figure. Two blood-vessels were observed running from the ciliary body into the capsule.[7]

Fig. 73.

Beer saw a lens, which had been depressed thirty years before by Hilmer, re-ascend in consequence of a fall upon the head; and in many instances, he had found cataracts on dissection, lying in the vitreous humour, firm, and only slightly contracted, the lenticular part bearing no marks of solution, and the capsular none of maceration.[8]

Re-ascension of a depressed or reclined cataract, is so common an occurrence, that some have gone the length of speaking of the operations of displacement, as affording only a palliative cure.[9] Re-ascension may take place at any period after the operation, but is

more apt to happen within the first fortnight than afterwards. The plan usually adopted by those who have practised displacement, has been to repeat the same operation after each re-ascension, till the lens has fairly settled in the situation which they assigned to it. Thus we find Mr Hey couching some of his patients six or seven times.[10] I shall not pretend to say, that in all cases of re-ascension, extraction through a section of about a third of the circumference of the cornea should be practised; but of this there can be no doubt, that it is proper in all such cases, if extraction is not immediately resolved upon, to wait for a few weeks, and watch what may be the effect of the aqueous humour on the cataract. It is quite evident, that many of the cures attempted by displacement, and recorded as instances favourable to the plan of couching in preference to extracting, were actually accomplished by the dissolution of the lens after re-ascension. Thus, Mr Hey tells us, that in one of his patients, "the cataract in the left eye appeared again; but in a few weeks it became sensibly wasted."[11] In a case operated on by M. Lisfranc, the lens re-ascended next day after the operation; for six months it underwent no apparent change, absorption then commenced, and in six weeks the third of the lens disappeared, so that a considerable share of vision was restored.[12] Should there be no appearance of dissolution after some weeks, it will become a question whether a repetition of displacement should be adopted, or an attempt made to extract the cataract. The latter cannot be safely attempted in the ordinary way, that is, by a section of half the circumference of the cornea, else the vitreous humour, in consequence of what it has suffered from the previous displacement, will almost certainly be evacuated; but the needle must be employed to press the cataract through the pupil, and a third part only of the circumference of the cornea opened, for its extraction with the hook.

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[1] Speaking of the situation of the lens in those who had been operated on by depression, and whose eyes he dissected after death, Daviel says—'Enfin il m'est 'arrivé de le rencontrer placé entre la retine et la choroïde, et ces deux mem-'branes déchirées en plusieurs endroits.'—Mémoires de l'Académie Royale de Chirurgie; 12mo; Tome v. p. 377; Paris, 1787.

[2] Betrachtung über die bishero gewöhnlichen Operationen des Staars; Nürnberg, 1785.

[3] Guy de Chauliac, who composed his work on Surgery in 1363, gives the following direction to the operator, regarding the time during which he should keep the needle in contact with the depressed cataract:—'Il la tiendra logée 'avec l' éguille pendant le temps qu'il faut mettre à dire trois fois le *Pater*, ou 'une fois le *Miserere*.'

[4] Beobachtungen über die organischen Veränderungen im Auge nach Staaroperationen, p. 17; Frankfurt am Main, 1828.

[5] Mr Hey relates (Practical Observations in Surgery, p. 82; London, 1803,) an interesting case, in which after 12 operations with the needle, he succeeded in detaching the capsule under such circumstances, and restored vision.

[6] Soemmerring's Beobachtungen, pp. 17, 22, 31.

[7] Ibid. p. 35.

[8] Lehre von den Augenkrankheiten; Vol. ii. p. 363; Wien, 1817.

[9] Ibid.

[10] Op. Cit. pp. 79 and 81 ; London, 1803.
[11] Ibid. p. 77.
[12] Lancette Française, 2 Mars 1837.

SECTION X.—EXTRACTION.

§ 1. *Extraction through a semicircular incision of the Cornea.*

Extraction, through an incision of the cornea, appears to have been first practised as a regular method of curing cataract by Daviel, a French navy surgeon settled at Marseilles, about the middle of last century. He confesses that he took the hint of this mode of operating from Petit,[1] who in 1708, opened the cornea to extract an opaque lens which had come forward into the anterior chamber; and that he felt himself urged to devise some new mode of operating for cataract, by the want of success which he found to attend the operation of couching, and the destruction of the internal textures of the eye, disclosed upon dissecting the eyes of those who had undergone this operation.[2]

Daviel commenced his operation of extraction, by passing a small lancet into the anterior chamber, close to the lower edge of the cornea. He then enlarged the incision, thus made, by another instrument somewhat similar to the former, but which, being sharp on the edges only, and blunt at the point, could with less danger to the iris be introduced into the anterior chamber. He completed the semicircular section with bent probe-pointed scissors. The inconveniences arising from the employment of so many instruments were perceived and speedily remedied by Palucci, La Faye, Sharp, and others, who substituted a single knife, which being entered at the temporal edge of the cornea, passed through the anterior chamber, made its exit at the nasal edge of the cornea, and either by its progressive motion or by being pressed downwards, completed a crescentic incision parallel to the lower edge of the cornea.

The operation of extraction divides itself into three periods. In the *first*, the cornea is opened with the knife. In the *second*, the anterior hemisphere of the capsule is opened, or destroyed. In the *third*, the exit of the cataract, or the extraction properly so called, is accomplished. Some dexterous and experienced operators have attempted to run these different periods together; but it is absolutely necessary to study them individually, and it is always safer to execute each of them deliberately and by itself.

I am not in the habit of dilating the pupil by belladonna, previously to performing extraction; but it is a practice which has been strongly recommended by some, as they think it tends to lessen the danger of wounding the iris during the section of the cornea, renders the capsule more accessible when it is to be opened, aids in the easier exit of the lens, and, by enabling us to avoid injury of

the iris in these three periods of the operation, diminishes the chance of subsequent iritis.[3] I believe, however, that after the section of the cornea is made, and the aqueous humour evacuated, the pupil does not generally continue dilated.

1*st Period.* In opening the cornea, care must be taken that the section be made of sufficient size, of a proper form, and at a specified and regular distance from the sclerotica. It must be large enough to allow the exit of the lens without hinderance, and without the application of much pressure on the eye; and to permit of this, the incision will require to extend to at least a half of the circumference of the cornea. Mr Ware supposes the whole circumference of the cornea to be divided into sixteen equal parts, and states that nine of these should be included in the incision. It must be of a proper form, not angular, nor indented, but regular, smooth, and parallel to the edge of the sclerotica, that it may heal, if possible, by the first intention, and leave no cicatrice to prevent the entrance of light into the eye. It ought not to be close to the sclerotica, for then the iris is left unsupported and is apt to protrude; neither ought it to be far from the sclerotica, for then the incision will be too small, (*Fig.* 74.) and if an opaque cicatrice follow, it will impede the light in its passage towards the pupil. A rim of cornea of at least the twentieth of an inch in breadth, (*Fig.* 75.) should be left between the sclerotica and the incision. Being thus fairly an incision in the cornea, it heals more readily than if it were close to the union of the cornea and sclerotica.

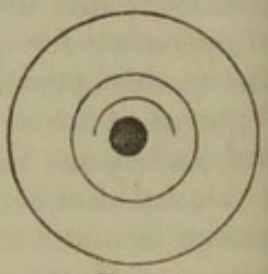

Fig. 74.

Fig. 75.

The inferior half of the circumference of the cornea has generally been chosen for the incision; some, however, have preferred the upper half; while others, entering the knife on the temporal side, 45° above the horizontal diameter of the cornea, have brought it out below the equator on the nasal side, and thus effected a semicircular section, one-fourth of which is above and three-fourths below the equator. The incision of the lower half of the cornea is the most easily executed; and through such an incision, the opening of the capsule and the exit of the lens, are accomplished with the least difficulty. But if this incision does not heal by the first intention, and especially if it be prevented from healing by a protruding iris, then a broad unsightly cicatrice will remain, very much impeding vision when the patient looks downwards, or even altogether preventing it. From this last objection, the incision at the upper edge of the cornea is entirely exempt. Even supposing that it heals only after suppuration, and that in consequence of protrusion of the iris through the incision, the pupil has been dragged very much upwards, or is entirely closed or hid behind the cicatrice, still the lower part of the cornea, which is the most valuable part, will be left perfect, and by opening up an artificial pupil behind this

part of the cornea, the patient will generally see as well as if the eye had a natural pupil. Through the incision at the upper edge of the cornea, it is somewhat more difficult to effect the division of the capsule, and to conduct the removal of the lens. Still, for the reason just explained, this is certainly the situation to be generally chosen. If the patient appears to have a particular difficulty in turning the eye down, or if the eye seems more than ordinarily irritable, the lower edge is to be preferred.[4]

Various forms have been given to the cornea-knife, but on the whole, the best is that which is now generally known as Professor Beer's. (*Fig.* 76.) The cutting edge is placed at an angle of about 15° with the back, which is continued in a straight line from the handle. The point is double edged for the length of a line; the strength and temper of the instrument such that the point is unbending. The blade should be convex on both surfaces, so as to be capable of exactly filling the wound it inflicts. It should also gradually increase in thickness as it does in breadth; but it must not be too thick, lest by over-pressure on the aqueous humour, and through the medium of the aqueous humour on the lens and vitreous body, the hyaloid membrane be forced to give way, so that on completing the section of the cornea, the lens bolts out of the eye along with part of the vitreous humour.

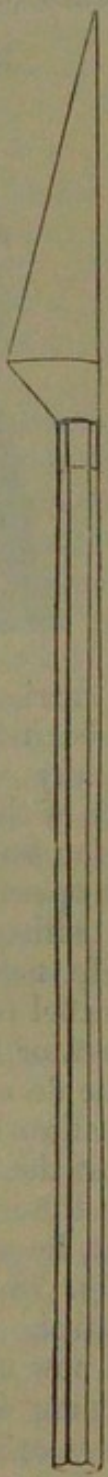

Fig. 76.

In the farther description of the operation, we shall suppose that the patient is seated on a chair, that it is the left eye which is to be operated on, and the upper half of the cornea which is to be opened. The right eye being covered by a pledget and roller, the fingers of the assistant and operator are to be applied, as has been directed at page 665, and especial care is to be taken that the operator's middle finger is so placed on the caruncula lacrymalis that the eye shall be prevented from turning towards the nose, a position, which, if by inattention to the rule here laid down, the operator permits, he may find it impossible to complete the section which he has commenced. This is one of the most important cautions in the whole operation.

The patient is to be informed that the operation is attended with little pain, but requires perfect composure on his part, and that he must on no account attempt squeezing with his eyelids, but allow them to be as if he had no power over them.

In making the section of the cornea, the operator will require to observe the following rules:—

1. The point of the knife is to be entered on the temporal side of the cornea, at the distance of $\frac{1}{20}$th of an inch from the sclerotica. (See *Fig.* 75.)

2. The instrument is to be directed at first perpendicularly to the lamellæ of the cornea, as if it were intended to penetrate into the iris, in order that the lamellæ may be fairly punctured, and the point of the knife arrive in the anterior chamber. If this rule is neglected, and the instrument be introduced in a direction parallel to the plane of the iris, it may easily slip between the lamellæ of the cornea, and not enter the anterior chamber at all.[5]

3. As soon as the point of the knife has penetrated into the anterior chamber, or, in other words, as soon as the *punctuation* of the cornea (*Fig.* 77.) is performed, the handle of the instrument is to

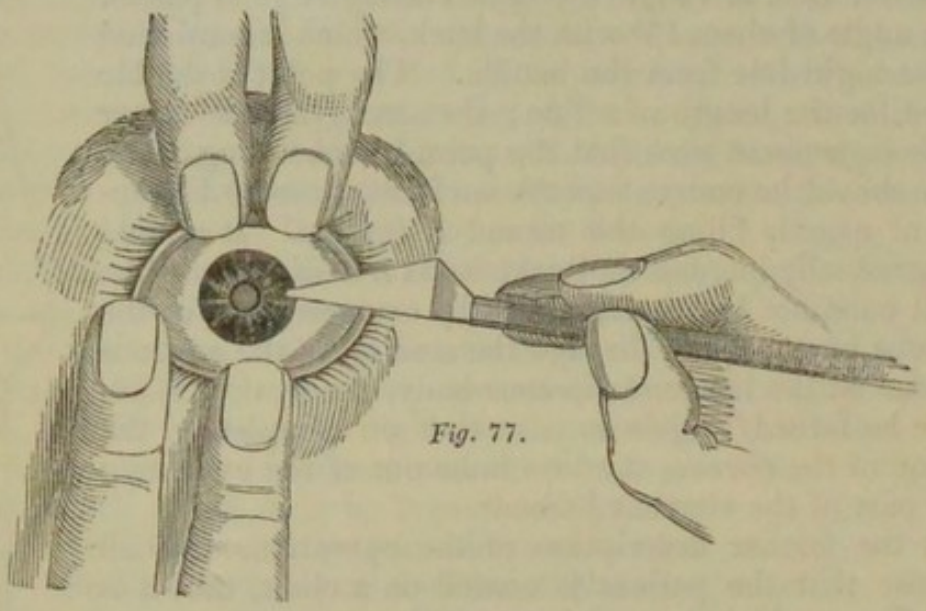

Fig. 77.

be carried back towards the temple, the flat surface of the blade is to be held perfectly parallel to the plane of the iris, and the extremity of the blade directed towards the point of exit on the nasal side of the cornea. Fixing his eye on this point, which ought to be at the same distance from the sclerotica as the point of entrance, the operator carries the instrument cautiously and steadily towards it, neither too quickly nor too slowly, and turning the edge of the knife neither forwards nor backwards, but keeping it perfectly parallel to the iris. In traversing thus the anterior chamber, let the operator bend his eye steadily on the point of *counter-punctuation;* if he do so, the point of the knife will be sure to follow, whereas, if he allow himself to be diverted to any thing else, for instance, to what the edge of the knife is doing, he may miss his aim, and bring out the instrument at a wrong place. Having reached the point of exit, he still carries the knife onwards till the counter-punctuation (*Fig.* 78.) is effected. He has now the eye completely under his control. The middle finger, which it was so important should rest till now upon the caruncula lacrymalis, and prevent the eye from turning inwards, may be shifted to the lower lid; and, if, by the operator's express desire, the assistant has been making pressure on the upper part of the eye, that pressure is to be discontinued.

4. The counter-punctuation (*Fig.* 78.) being effected, the section of the cornea is to be completed, simply by the progressive motion

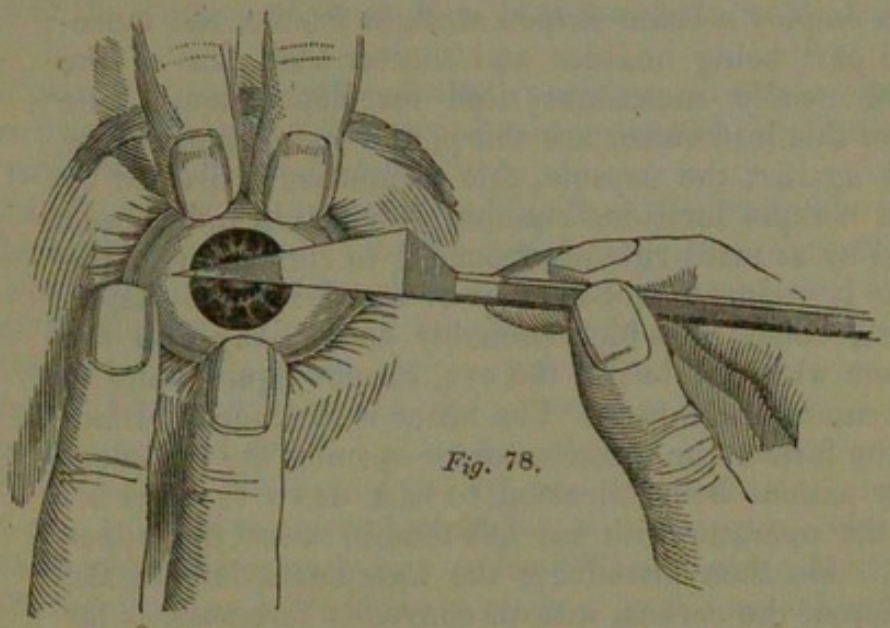

Fig. 78.

of the knife, till it has cut itself out. In this part of the operation, no pressing upwards of the edge of the knife is allowable, much less any sawing motion, or any dragging of the eye towards the operator. The handle of the instrument is to be kept well back, so that the extremity of the blade may avoid touching the nose as it advances. When the incision is nearly completed, the operator cannot proceed too cautiously. If the aqueous humour has been entirely retained till now, the knife should be turned a little on its axis, to allow it to escape. If this is neglected, the pressure of the knife upon that fluid, acting on the lens and vitreous humour, is apt to burst the hyaloid membrane, particularly if it is weak, as it often is in old age, and thus give rise to ejection of the vitreous humour. The instant that the section is finished, the upper eyelid is allowed to fall, the light admitted into the room ought to be moderated, the patient is to be assured that the worst of the operation is over, and recommended to compose himself.

Similar rules are to be followed, if the incision is made downwards or laterally.

When from the history of the case, or any particular symptom, there is a likelihood that the hyaloid is weak, or even dissolved, it is proper to stop before the incision of the cornea is finished, withdraw the knife, and proceed to the second period of the operation. After the capsule is opened, the small portion of cornea remaining undivided, is to be cut across with a probe-pointed convex-edged knife, or with scissors.

2*d Period.* Various instruments have been employed for opening or destroying the anterior hemisphere of the capsule, which is the object of the second period of the operation. Some employ a simple needle, like a common sewing needle, fixed in a handle, its

point bent with a gentle sweep, or at a right angle; (*Fig.* 79.) and with this they make a single scratch through the capsule, in general quite sufficient to allow the exit of the lens. Others employ a lance-shaped straight needle, the lance-shaped part being broader and shorter than that of the straight needle sometimes used for depression. The edges of this instrument are sharp, and one of them being turned against the capsule, this membrane is divided by several oblique incisions running from right to left, and crossed by as many running from left to right, so that the capsule is reduced to a number of small lozenge-shaped portions, some of which probably come away with the lens, but which, if left in the eye, cannot again unite to form a capsular cataract. The latter is the more satisfactory, the former the easier mode of opening the capsule.

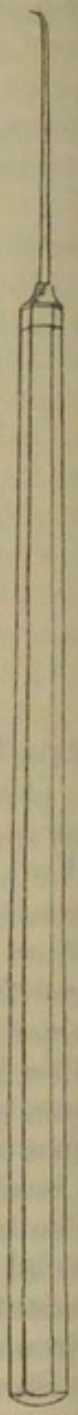

Fig. 79.

The patient being directed to look down towards his nose, the operator with his left thumb raises the upper eyelid. He then introduces the instrument behind the loose flap of the cornea, with its convexity foremost, as far as the pupil; the point or cutting edge is turned round towards the surface of the capsule; the division of that membrane is effected, as has already been stated, by one or by several incisions. If one incision only is made, it should extend completely across the anterior hemisphere of the capsule; the instrument is now cautiously withdrawn, with its convexity foremost, to prevent it from catching in the iris or cornea; and the lids are again permitted to close. The patient ought here to be cautioned not to squeeze the lids together, but merely to keep them shut, as if he were asleep.

3d Period. If gentle pressure were exercised upon the eyeball, during the second period of the operation, and continued after withdrawing the instrument with which the capsule was divided, the lens would immediately follow. The experienced operator may run in this way the second and third periods together, but those who have not operated frequently, will find it advantageous to pause for a few minutes before proceeding to the third period.

It is usual to have the curette, scoop, or (as it is sometimes called) Daviel's spoon, attached to the opposite extremity of the same handle in which is fixed the needle for opening the capsule. Holding, then, the curette in the hand which formerly held the knife and the needle, the operator, with the thumb of the other hand, raises the upper eyelid, and directing the patient again to look down towards his nose, presses gently and continuedly on the upper part of the eyeball. The pupil is seen to dilate, the superior edge of the lens advances through the pupil, the whole lens passes into the anterior chamber, and makes its exit through the incision of the cornea, without any other interference, in general, or any other means of extrac-

tion being employed, than a continuance of moderate, not forcible, pressure on the upper part of the eyeball. The curette is used to assist the extraction, only if the lens appears to be arrested between the lips of the incision of the cornea, or if it appears to be falling in pieces.

The patient should now be desired again to close his eyes as if he were asleep, while the operator, having received the lens on his finger nail, examines whether it is entire.

When the patient has recovered a little from the confusion arising from the admission of light into the eye, he may turn himself round on his chair, so that his back shall be towards the window; and the surgeon, holding up his hand at the distance of about 18 inches from the patient's face, may desire him to open a little the eye from which the cataract has been removed, the other eye being still covered with the pledget and roller, and to say whether he sees any thing. It were better, in some respects, to dispense with this; but the patient who submits to extraction, knows that such experiments are made and expects them, and if put to bed without having ascertained what degree of vision he is likely to recover by the operation, is apt to get anxious, and to make trials of his own, which may be much more detrimental.

The patient is now to turn again towards the light. The operator with his thumb repeatedly and gently rubs the upper eyelid over the surface of the eyeball, raises the lid, and rapidly examines the appearance of the pupil and the state of the flap of the cornea. If the pupil is circular and clear, and the edges of the incision of the cornea accurately in contact, he desires the patient to look upwards, and then immediately to close his eyes, informing him at the same time, that he is not to make any further attempt to open them till he is desired to do so, but to keep them closed, without squeezing the lids together, and, in fact, exactly as if he were asleep. A strip of court-plaister, about an inch long and a quarter of an inch broad, is now to be applied from the middle of the upper lid to the middle of the lower, both over the eye which has been operated on, and over the other. The eye is thus protected from the intrusion of foreign matters, the patient is prevented from using it, and the eyelids are made gently to compress and close the wound of the cornea. A light roller, with a fold of linen attached to it, is put round the head, the fold hanging down over the eyes.

Modifications of extraction according to varieties of cataract, and peculiar states of the eye. 1. In cases of capsulo-lenticular cataract, it is proper to attempt the extraction of the capsule as well as of the lens. Some do this before, others after the lens is removed.

The cornea being opened in the usual way, we may endeavour with the needle to divide the capsule circularly, as near the edge of the pupil as the instrument can be applied without injuring the iris. The part of the capsule included within the circular division may sometimes be brought away on the point of the needle; but if this cannot be done, it should be extracted by means of a pair of small

forceps, (*Fig.* 26, p. 208) and then the lens is to be removed as in ordinary cases. This is the mode recommended by Mr Ware.

Beer, on the other hand, first extracted the lens, and then attempted to remove the shreds of the opaque capsule, by means of the hooked forceps. This instrument is to be introduced through the incision of the cornea and through the pupil, opened so as to receive one of the shreds, and shut so as to hold it without any possibility of its escaping. Then with a sudden twitch, the shred is to be extracted; and this is to be repeated till the whole of the shreds are removed.

2. We sometimes know from the history of the case, that the posterior hemisphere of the capsule is opaque; or immediately after the lens is removed, we observe that there still remains an opacity, impeding vision. If we are satisfied that this opacity consists neither in opaque shreds of the anterior half of the capsule, nor in some portion of the soft exterior substance of the lens retained in the eye, we may conclude that it is the posterior hemisphere of the capsule in a cataractous state. Perhaps the better plan in such a case, would be to allow the eye to recover from what has already been done, and by a subsequent operation with the needle, to endeavour to remove the opaque membrane out of the axis of vision. Some, however, have recommended that we should immediately proceed to destroy, and if possible, to remove the posterior half of the capsule. This they have attempted by means of a needle, of which one of the edges forms a hook or barb, so that it enters easily through the membrane in question, and being then turned one quarter round on its axis and suddenly withdrawn, brings along with it a portion of the diseased capsule. This manipulation is to be repeated, till at least a considerable aperture is formed for the transmission of light into the deeper parts of the eye, an object which will scarcely be effected without some loss of vitreous humour.

Accidents during or after extraction. 1. The spirting out of the aqueous humour before the counter-punctuation of the cornea is effected, is one of the most common accidents during the first period of extraction. The iris, in consequence of losing its usual support, immediately falls forward, and getting under the edge of the knife, will be cut across, if the section is pursued without pushing back the iris into its place. This must be attempted by applying the point of the forefinger on the cornea, over the entangled part of the iris, and pressing the cornea against the blade of the knife. In consequence of the pressure, the iris will sometimes instantly retract, and resume its natural position. The finger being kept on the cornea, to prevent the iris again falling forwards, the knife is to be carried quickly across the anterior chamber, and the counter-punctuation effected. This once accomplished, there is no farther danger of the iris falling under the edge of the knife, and the section is to be completed in the ordinary way.

If the iris does not retire on pressure of the cornea, the following plan may be adopted. The common extraction knife being with-

drawn, Mr Guthrie's double-knife, one of the blades of which is blunt, and the other sharp-pointed, may be introduced through the aperture which has already been made, and pushed cautiously through the anterior chamber to the nasal edge of the cornea. The sharp-pointed blade is now to be pressed forward so as to effect the counter-punctuation, and the incision finished in the usual way. If the double knife is not at hand, a probe-pointed knife may be used instead, and when it has reached the nasal side of the cornea, an opening may be made over its extremity with another knife so as to allow it to come through, after which the incision is to be finished exactly in the same way as if the sharp-pointed knife only had been employed.

Sometimes it may be better, when the aqueous humour has spirted out on making the punctuation, to withdraw the knife, and defer the operation till a future day.

2. When the point of the knife reaches the nasal edge of the cornea, the operator occasionally finds it difficult to bring it through, in which case he may derive advantage from pressing the cornea against the knife with his finger-nail. In other instances, the point of the knife is seen to bend to one side, so that it is impossible to perform the counter-punctuation in the ordinary way. When this is the case, the knife may be withdrawn, and the operation postponed; or the cornea may be opened on the nasal side with another knife, and then the knife, which is already across the anterior chamber may be carried through the opening, and the section completed. Mr Guthrie's double-knife may also be useful in such a case.

3. Should the point of the knife, instead of being brought out through the cornea at the proper place for the counter-punctuation, appear ready to penetrate through the sclerotica, it must be cautiously withdrawn a little, and then pushed through the cornea at the distance of $\frac{1}{20}$th of an inch from the nasal edge.

4. Too small a section of the cornea is a very frequent occurrence, in consequence of the operator bringing out the knife at too great a distance from the nasal edge, and perhaps considerably above the equator, of the cornea. In this case, the incision must be enlarged to a semicircle. There is no practice more apt to prove fatal to vision, than that of forcing the lens through a small section. Loss of vitreous humour, severe pressure upon the iris, and destructive inflammation are the consequences to be dreaded.

The enlargement is generally effected by the aid of Daviel's scissors, of which there are two pairs. The one is so bent that it serves for dividing the temporal side of the right cornea and nasal side of the left, while the other pair serves for the temporal side of the left cornea and nasal side of the right. On the supposition that the incision is at the upper edge of the cornea, *Fig.* 80 represents the latter pair. Rarely will the incision require to be enlarged at both extremities; but upon no account is the operator to proceed to the second and third periods of extraction, if he is conscious that the

section of the cornea is less than a semicircle. Standing behind the patient, and resting the scissors on the back the of finger which raises the upper eyelid, the surgeon opens them a little, and passes the one blade behind the middle of the flap of the cornea into the anterior chamber, while the other remains external to the cornea. The instrument is then to be carried close to the temporal or nasal edge of the cornea, according to circumstances, and with a single stroke, the incision is to be enlarged to the requisite dimensions.

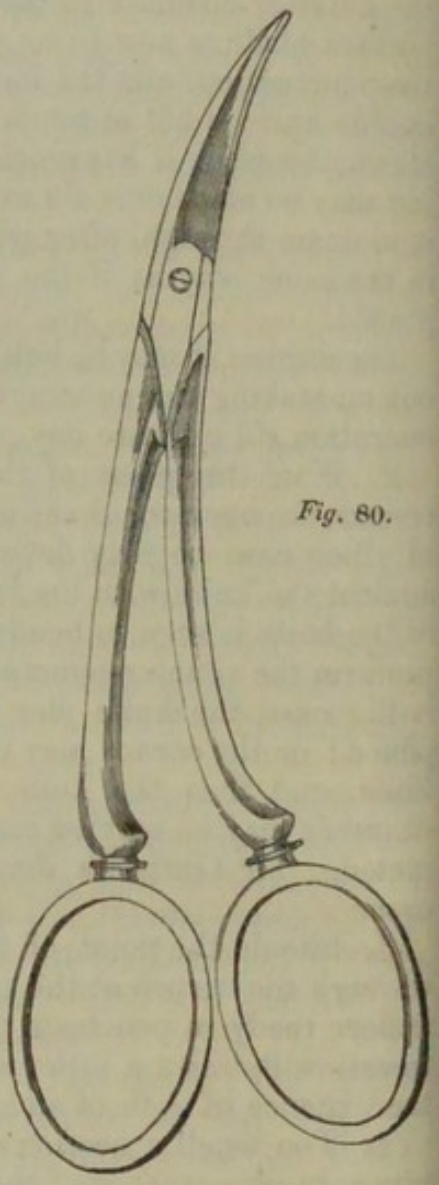

Fig. 80.

The part divided by the scissors is not so apt to heal by the first intention as that which is divided by the knife; on the contrary, the edges of the part divided by the scissors are liable to swell, inflame, gape, and allow the iris to protrude. Some therefore try a knife, but this is not so convenient an instrument for the purpose.

5. Some operators make it a constant practice not to complete the section of the cornea with the usual extraction knife, but to withdraw that instrument when the incision is nearly finished, and to divide the remainder of the cornea with the scissors, or with a small probe-pointed knife. Some prefer a knife with a convex, and others one with a concave edge. This practice is decidedly proper, when the operator observes that he has unfortunately so directed the edge of the knife first employed, that if he continues to press it onwards, the incision will probably extend beyond the cornea, and divide the iris or sclerotica. When he sees that this is likely to happen, he should by all means withdraw the knife, and complete the incision in the manner above mentioned.

Some advise the same practice on another ground, and one of unquestionable importance. They tell us, that it is just as the last portion of the cornea is divided, in the usual method, that the hyaloid is apt to be burst, and the vitreous humour to be ejected; and to prevent this, they recommend the knife to be withdrawn, the second period of the operation to be performed, and then the incision finished with the scissors or a small probe-pointed knife.

6. The iris is apt to be wounded in different stages of the operation. It is sometimes pricked in making the punctuation, it may fall before the knife as the latter passes through the anterior chamber,

it may be transfixed in attempting the counter-punctuation, and lacerated during the process of opening the capsule, or in withdrawing the needle employed for this purpose. Incisions are thus made in the iris, and sometimes a piece of it is fairly cut out, especially when it falls before the knife, and the operator, unsuccessful in pressing it back, continues the incision. A cut into the iris generally forms a permanent false pupil. If it be the edge of the natural pupil which is cut into, or if a portion of the iris, including the edge of the pupil, be removed, we have, after the case recovers, a large, irregular pupil, which, though it looks ill, does not materially affect vision.

7. When the operator, proceeding to the third period of extraction, makes pressure on the upper part of the eyeball, but observes that notwithstanding this, the cataract does not advance through the expanding pupil, he ought to desist, and ask himself whether the section of the cornea be of the proper size, and whether he has reason to think that he has in a sufficient manner opened the capsule. If the answer in the affirmative is well founded, then merely by waiting a few minutes, rubbing the eye gently through the medium of the upper lid, moderating the light still more than has been done, and repeating the pressure on the upper part of the eyeball, the lens will probably advance, and make its exit in the usual way. But if the smallness of the section be the cause of the cataract not coming forward, the section must be enlarged; or if the capsule has been imperfectly divided, the second period of the operation must be repeated. Pressure is then to be employed as before, when, in general, the cataract will advance. The pressure must be at once moderate and sufficient. If it is too forcible, the hyaloid membrane is very apt to give way, and the vitreous humour to be ejected before the lens. If from timidity on the part of the operator, the pressure be too light, or too soon relaxed, the lens may not advance, and the operator will distress himself with imaginary difficulties. Yet it sometimes happens that the section of the cornea is sufficient, the capsule sufficiently opened, and due pressure made, without the lens advancing. This arises from an unnatural adhesion between the lens and the capsule, and is to be remedied in the following manner. The operator is to continue the pressure till the upper edge of the lens appears in view, he is then to introduce a thin sharp curette through the pupil, and behind the lens, and by the motion of this instrument from right to left, to separate the capsule with the lens enclosed, from the hyaloid membrane. A hook is then to be introduced, and the lens and capsule extracted. This will scarcely be effected without some discharge of vitreous humour, but certainly less risk attends this mode of procedure than that of forcing out the cataract, under such circumstances by continued pressure.

8. The lens falling in pieces at the moment of extraction, part of it may remain behind the pupil. In this case, if the operator rubs the eye gently through the medium of the upper lid, and then opens

the eye, he will generally find that the fragments have advanced into the anterior chamber. They will readily escape on raising the flap of the cornea with the curette. Any small particles which may be left will dissolve in the aqueous humour.

It sometimes happens that on examining the eye, four or five days after the operation, we find the patient does not see so well as he did immediately after it was performed, and that the pupil, which then seemed clear, is now opaque. If there has been no pain nor other signs of inflammation, this opacity is probably owing to some portion of the lens which had remained concealed in the edge of the capsular cavity, or to that effusion of unorganized lenticular substance, dignified by some experimenters on the lower animals with the name of *regeneration of the lens*, and which will clear away in the course of a week.

9. An escape of vitreous humour may take place before, along with, or after the exit of the lens. This accident may arise from one or other of a variety of causes; such as, immoderate external pressure on the eye; pressure with too small a section of the cornea, or an imperfect division of the capsule; spasm of the recti or orbicularis palpebrarum; undue pressure on the interior of the eye, in consequence of too great thickness of the knife, or retention of the aqueous humour during the whole of the first period of the operation. It is much more frequently the result of weakness of the hyaloid membrane from age or from disease, than of any other cause. When the eye is known to have been glaucomatous before becoming affected with cataract, or when the subject is advanced in life, and, in the ophthalmological sense, arthritic, we may expect to meet with a dissolved state of the hyaloid membrane. If we operate by extraction in such cases, and at once extend our incision to a semicircle, we may lay our account with an ejection of vitreous humour.

If the capsule has been opened in a previous operation through the sclerotica, with the view, for example, of softening a hard cataract previously to attempting to divide it, or if displacement has been ineffectually performed, and the operator proceeds to extraction, he will almost to a certainty encounter a dissolved hyaloid membrane, and of course an evacuation of vitreous humour.

If the escape of vitreous humour commences before the lens has been removed, no farther pressure must be made on the eye, but a hook is to be introduced, so as to lay hold of the cataract, which is to be withdrawn as speedily as possible. The eye is then to be shut, and gently rubbed for some time through the medium of the upper lid, in order to replace the iris, which is very apt, when there has been any escape of vitreous humour, to protrude through the wound of the cornea.

It not unfrequently happens, that the instant the section of the cornea is completed, the lens is ejected with violence, along with a quantity of vitreous humour. This is particularly apt to occur, if the fissure of the eyelids is short, so that they require to be a

good deal dragged, and of course the eyeball is considerably pressed upon by the fingers of the assistant and of the operator, to allow the eyeball to be sufficiently exposed. In this case, also, we must endeavour, by gentle continued friction, to replace the iris, and bring the edges of the wound of the cornea close together.

The same practice is to be followed, if the evacuation of vitreous humour occurs, as it sometimes does suddenly, when we direct the patient to look at any object held before him, after the removal of the cataract. In this case, the turning of the eye by its muscles, seems to cause the accident.

In general, after a loss of vitreous humour, the cornea heals more slowly than usual, the cicatrice is broader, the pupil not unfrequently distorted, and vision less perfect. The danger resulting from this accident, arises, within certain limits, not so much from the loss of vitreous humour directly, as from the gaping state in which the wound of the cornea is left, the hyaloid membrane probably hanging through it, keeping it from uniting, and causing the eye to inflame. If only a fifth or even a fourth of the vitreous humour is lost, vision may not be materially affected. If a third is lost, we cannot calculate on distinct vision. If more than a third is evacuated, the pupil generally closes, and the eyeball shrinks to a small size. Occasionally it happens, in consequence of the loss of even a moderate quantity of vitreous humour, that the pupil dilates, and the eye, although previously sensible to light and shade, is found on recovery from the operation, to be completely amaurotic.

10. As the patient closes his eye, after the exit of the cataract, the flap of the cornea sometimes turns down. It must immediately be pressed up into its place, by means of the scoop.

11. It sometimes happens, immediately after the exit of the lens, that the cornea sinks backwards, and presents a deep concavity, instead of its natural convexity. It is essential to remedy this malposition, as it is by no means certain that the cornea, when the aqueous humour comes to be re-secreted, will resume its proper direction. If it does not, protrusion of the iris, and destructive inflammation, are likely to ensue. It is, in general, easy to remedy the unnatural state of the cornea, by introducing the scoop behind it, and pressing the centre of it gently towards us.

M. Maunoir, in a case of this sort, was led to adopt a different practice.

Case 273.—Having performed extraction upon a man, of 82 years of age, he perceived, to his regret, that although the pupil was perfectly black, and the iris uninjured, the anterior and posterior chambers of the eye were not replenished, the cornea became sunk and wrinkled, a few bubbles of air penetrated into the anterior chamber, and the patient had no vision. In these circumstances, M. Maunoir sent immediately for some distilled water, warmed it, placed the patient on his back, and poured the water round the eye. He then opened the eyelids, and raised the flap of the cornea. The water penetrated into the aqueous chambers, the wrinkles of the cornea disappeared, and its convexity was restored. Having kept the eye shut for some minutes, he then directed the patient to open it, and found it in the most satisfactory condition. The patient distinguished all the ob-

jects presented to him, as well as after the most successful operation. A slight pain was felt from the introduction of the water, but went off in a short time. The eye healed without difficulty, and, when opened a week after the operation, it was free from swelling and inflammation; the cornea was perfectly united, but the pupil was a little obscure, and the patient complained that he did not see so well as immediately after the operation. Six days, however, after the bandage was removed, the dimness of the pupil was much diminished, the sight grew stronger from day to day, and no doubt was entertained that the patient would soon be able to read common print.[6]

The practice in this case must be regarded more as a feat, showing what the eye will bear, than an example to be followed in similar circumstances. A bubble of air, getting behind the cornea, which appears partly to have led M. Maunoir, to think of filling the aqueous chambers with water, is an accident of no moment. If it does not disappear on rubbing the eye gently, it may be left.

12. Immediately after the lens has escaped from the eye, the iris, may become involved in the wound of the cornea, or protruded through it. If there is no escape of the vitreous humour, this accident is, in general, very easily remedied, merely by rubbing the eye for a little through the medium of the upper lid, and then suddenly exposing it to the light. Should this not succeed, we may endeavour to press the iris into its place with the curette, following up this with rubbing of the eye as before; and should this also fail, a small snip may be made in the protruding portion of iris, when it will often return almost of itself into the eye, in consequence of the aqueous humour, which was lodged behind it, draining away.

It is very different with a protrusion of the iris which is apt to take place about the fourth day after the operation, or later, and which, though often attributed to some accidental blow on the eye, restlessness on the part of the patient, or improper attempts which he may have made to use the eye, ought, I am convinced, to be ascribed, in general, rather to the supervention of undue inflammation of the cornea, and of inflammation within the eye, than to any mere mechanical cause. Not denying that this protrusion is favoured by making the incision too close to the sclerotica, it appears to be much more frequently the consequence of too small a section of the cornea, so that the lens had to be pressed out of the eye with force.

This protrusion of the iris does not take place suddenly. We first of all observe the wound gaping a little, and its edges white, swollen, and everted. Next, the iris begins to show itself between the lips of the wound, and as the aqueous humour accumulates behind it, this *staphyloma iridis* increases. At the same time, the protruding portion of the iris inflames, and is united by effused lymph to the edges of the wound of the cornea. The conjunctiva and sclerotica redden, the discharge of tears is frequent and irritating, the patient feels as if some foreign substance of considerable bulk were lodged beneath the eyelids, the eye and supra-orbital region become painful, the skin dry and hot, and the pulse quick. The protrusion is apt to be increased, if the patient is affected with cough.

No direct attempt need be made to reduce the protruding portion

of the iris. Snipping it off with the scissors, however, can do no harm, and is the practice I would recommend. A vein of the arm ought to be opened, once, and again, if necessary; leeches are to be applied liberally round the eye, and a blister behind the ear. The bowels should be acted on by a brisk purgative, and calomel with opium administered till the mouth is affected. These are the most likely means to abate the inflammatory action upon which the protrusion appears to depend. If the protruding piece of iris has not been snipt off, belladonna is at first to be avoided, as rather tending to favour the protrusion; but after the iris is united to the cornea, belladonna aids in approximating the edges of the wound of the cornea, by causing the protruding portion of the iris to contract. From day to day, the protrusion ought to be touched with a sharpened pencil of lunar caustic.

A broad cicatrice of the cornea, with a dragging of the pupil towards the cicatrice is the necessary consequence of this accident, even when the most appropriate means of cure are had recourse to. The pupil may be so much distorted, as to be completely hid behind the cicatrice, with the lower half of the iris very much on the stretch, a state of matters which still affords a tolerable chance of vision being restored, by the formation of an artificial pupil. In more unfortunate cases, however, the inflammation is so severe and extensive, and is prolonged for such a length of time, before the prolapsed portion of the iris shrinks and the cornea unites, that the vessels of the eye are left varicose, and the retina insensible.

13. A probability has been started, that in old or enfeebled individuals, there might occur a want of sufficient inflammation to unite the edges of the divided cornea. In such a case the flap of the cornea will become nebulous, and the aqueous chambers will either remain empty, or from time to time be subject to sudden evacuation of their contents through the ununited incision. In a woman, about 50, on whom I operated at the Glasgow Eye Infirmary, the cornea did not unite for some weeks. She had long been in the use of tobacco and spirits in small frequent doses, and kept her room in the Infirmary excessively warm and airless. In a feeble emaciated old woman on whom I operated in private, the lips of the wound of the cornea continued perfectly close for 14 days; they then opened, the whole aqueous humour was discharged, and the cornea became flaccid. In the afternoon of the same day, the eye was again plump, and ultimately complete union was effected, and good vision restored.

Mr Raleigh has recorded three cases of extraction, in natives of Hindostan, in whom, from want of power, or from indisposition in the constitution to take on inflammatory action, formidable obstacles presented themselves to a successful issue.

Case 274.—The first case related by Mr Raleigh, is that of a person, about 55 years of age, rather infirm, from one of whose eyes a hard lenticular cataract was extracted, without any violence. No vitreous humour escaped; the pupil, previously dilated by belladonna, regained its circular figure; and the divided edges of the cornea closely adapted themselves to each other. The eye seemed

to perish for want of action; the cut edges of the cornea continued in close connexion, and there was no protrusion of vitreous humour; still the aqueous chambers did not fill; the cornea became flaccid, dim, and gradually opaque; after a time, slight chemosis appeared, which a few leeches removed. The case ended in a sinking of the whole globe.

In his second and third cases, Mr Raleigh, observing a similar want of action in the eyes operated on, used with good effect stimulants to excite inflammation, such as ground pepper applied to the eye, a pepper poultice over the brow and temple, and solution of nitrate of silver to the eye. At the same time, he gave sulphate of quina internally.[7]

It sometimes happens, perhaps in consequence of carelessness in adjusting the flap of the cornea, that the edges of the wound unite in so imperfect a manner, as to be unable to withstand the pressure of the aqueous humour. The consequence is, that there is protruded from between the lips of the wound, a thin semi-transparent membrane, having the form of a vesicle, distended by aqueous humour, and giving rise to the sensation of a foreign body in the eye. This vesicular protrusion generally makes its appearance in the course of a few weeks, but I have seen it occur years after the operation. If the membrane which forms it, and which has generally been regarded as the lining membrane of the cornea, be punctured, the tumour subsides; but speedily re-uniting, the membrane is protruded as before, so that it is better to snip it off, and, keeping the eye shut for several days, endeavour thus to procure a more perfect union. The cicatrice, in ordinary cases of extraction, slowly disappears, and in the course of a few months is sometimes quite invisible; but in every such case as has just now been described, the cicatrice will be considerable and indelible.

14. Inflammation is the consequence most to be dreaded, after the operation of extraction. It attacks one or several of the textures of the eye, occurs with various degrees of severity, and comes on at different periods of time after the operation. The conjunctiva is frequently its seat, and then it presents the symptoms of puro-mucous ophthalmia; the eye feels as if filled with sand; there is considerable chemosis, with puriform discharge, and adhesion of the lids. In other cases, the cornea inflames more than is consistent with the healing of the wound by the first intention; the lips of the incision become white, swell, and gape, the iris is apt to protrude, and a broad unsightly cicatrice is the result. In many instances, the sclerotica and iris inflame; the patient, sometimes in six or seven hours after the operation, is affected with severe pulsative pain in and round the eye, aggravated during the night, followed by effusion of lymph from the iris, opacity of the shreds of the capsule, adhesions of the iris, and, it may be, closure of the pupil. In other cases, and especially where the flap of the cornea has been often lifted, and numerous instruments introduced into the interior of the eye, the inflammation, although internal, does not partake so much of the adhesive as of the suppurative character; so that the organ is in still greater danger of being destroyed. Pus is deposited

in the anterior chamber, and in the substance of the cornea, the eyeball swells to a prodigious size, and is frightfully protruded from the orbit. Severe pain entirely prevents sleep, and is scarcely moderated by any kind of treatment. The cornea sloughs, at least I have seen the lamellæ exterior to the onyx separate in the state of a slough, and gradually the eye shrinks, the front of it being left opaque. The peculiar inflammation called by the Germans arthritic, and which, whatever be its nature, is undoubtedly a specific inflammation, is extremely apt to be excited by the operation of extraction.

It rarely happens but that this operation is followed by such a degree of inflammation, in one or other of the textures of the eye, as to require the abstraction of blood from the system. So well established is this observation, that some make it a general rule to bleed the patient at the arm, in the course of the first 24 hours after the operation, whether pain is complained of or not. The quantity of blood to be removed, and the frequency with which venesection is to be repeated, will of course be regulated by the age and constitution of the patient, and the nature and severity of the inflammation. Puro-mucous conjunctivitis will require much less depletion than sclerotitis or iritis, and might perhaps yield to local remedies alone; but when the internal textures of the eye are attacked, copious and repeated blood-letting from the system will be necessary, followed by leeches to the temples, the use of calomel with opium internally, and the application of blisters behind the ear or to the nape of the neck. If there appears to be any tendency to protrusion of the iris through the wound, belladonna ought to be avoided; but otherwise it ought to be employed to counteract contraction of the pupil.

15. Inversion of the lower eyelid is an occurrence which happens not unfrequently after extraction. It is attended by a considerable degree of œdema of the eyelids, of which it is probably a consequence. The inversion excites inflammation of the eye, and is apt to prevent union of the wound of the cornea. Attempts are sometimes made to remedy it by strips of plaister crossing each other on the lid, or by a short thick pad, sewed to the middle of a long piece of tape, which passing over the nose and under the ears, crosses on the occiput, and is tied upon the forehead. But these means generally prove ineffectual, so that recourse must be had to the excision of a fold of skin from the inverted eyelid. (See pages 211, 213.)

After-treatment. The room in which the patient is to sleep after the operation, should be large and well aired, with a temperature of from 50° to 55° Fahr. and free from cold draughts. The patient ought neither to be loaded with unnecessary bed-clothes, nor exposed to cold from their deficiency. He may lie either upon his back, or on the side opposite to that of the eye which has been operated on. He should be put to bed with as little movement of the head and body as possible. The room is not to be made too dark, but is to be kept perfectly quiet, in order to avoid all causes

of sudden alarm or starting. All unnecessary talking between the patient and those about him is to be prevented. A careful assistant or experienced nurse, sitting constantly by the bed-side for the first 48 hours and for several succeeding nights, ought attentively to watch the patient when he wakes, taking care, especially, that he does not turn suddenly round upon the eye which has been cut, or put up his hand to rub the eye. If there is any particular reason to dread the latter accident, it may be proper to muffle the patient's hands, and pin them together, or down by his sides.

The length of time during which the patient is to be kept in bed, is a point upon which there has been a wide diversity of practice. It would appear that Wenzel was at one time in the habit of confining his patients to their backs, without change of posture for a fortnight or three weeks, but that afterwards he shortened the period of confinement to eight or ten days. Mr Phipps, on the other hand, examined the eyes on the morning after the operation, applied a shade, and allowed the patient to rise.[8] A middle course appears to be the most judicious. The incision may be looked at on the third or fourth day. On the fifth or sixth day, perhaps, the patient may be allowed to sit up for a short time. On the seventh or eighth, the eye may be fairly examined, but immediately afterwards covered with the shade. In ten or twelve days, the patient may be allowed to look at large objects, and to walk about his room.

It is desirable that the patient's bowels should not be disturbed for the first 24 or even 48 hours after the operation, as the movements of the body in getting out of bed, and while at stool, may prove injurious to the eye. After 48 hours, a laxative clyster may be administered, if necessary. A strict antiphlogistic plan of diet is to be observed for eight days or more, according to circumstances; after which, soup may be allowed, and in about a fortnight after the operation, a little solid animal food.

The aqueous humour generally continues to be discharged from the eye for about 48 hours; in some cases, however, for a shorter period, and often for a much longer, even for weeks. Lest the discharge of the tears, and also of the aqueous humour, if it flows from the eye, should be prevented, it is improper to cover up the eye too closely, and still more improper to load it with dressings and bandages. It is of the utmost importance, however to keep the eyelids still, and prevent any attempt to use the eyes. These objects are completely obtained by the strips of court-plaister, from the employment of which I have never witnessed any bad consequences. I generally allow those which are applied immediately after the operation, to remain for two or three days, after which I remove them, and, having bathed the eyelids with warm milk and water, without opening the eyes, replace the plaisters by new ones. This I repeat every day, till I consider the wound consolidated.

§§ 2. *Extraction through a section of one-third of the circumference of the Cornea.*

When treating of the accidents attendant on the operations of displacement, I mentioned that the lens occasionally passes through the pupil, and lodges between the cornea and the iris. It is not quite correct to say, that in this situation it is in the anterior chamber, for as the axis of the aqueous humour is to that of the lens as 3 to 4, it is evident, that after the lens has passed through the pupil, it will occupy not only the anterior chamber, but the posterior also, and even part of the space which it filled while in its natural situation. The iris consequently will be pressed backwards by the dislocated lens, and it will be easy to lay open a third of the circumference of the cornea, without touching the iris. A hook being then introduced, the lens is to be laid hold of, and extracted.

This mode, then, of removing a lens which has fallen in front of the iris, has led, in a variety of other cases, to the practice of opening only a third, or less than a third, of the circumference of the cornea. The wound in this way being less extensive, will in general heal more readily; and even should it inflame and unite but slowly, will leave less deformity, and produce a much less degree of impediment to the passage of light into the eye, than the broad semilunar cicatrice, which sometimes follows the common operation of extraction. The lips of the incision, when only a third of the circumference of the cornea is opened, will close much more completely immediately after the operation is finished, so that we need not be afraid of prolapsus of the iris, and may therefore, without hesitation, dilate the pupil by belladonna before proceeding to the operation, which will both enable the lens to be more easily brought forward in front of the iris, and render injury of the iris less liable to occur. Through a small section, also, of the cornea, especially in cases of dissolved hyaloid membrane, the vitreous humour is less likely to be evacuated to any considerable extent.

Of the reality of some of these advantages I am able to speak decidedly, as I have employed this method of extraction in a variety of cases. I prefer it, when it is my object to extract a capsular cataract, or when I have reason to believe that the vitreous humour is dissolved.

1. *Capsular and siliquose cataracts.* The following is the plan which I have successfully adopted in cases of *capsular* or *siliquose cataract*, the lens having been absorbed, either spontaneously or in consequence of an accidental wound of the capsule, or removed by previous operation. I place the patient in the horizontal position, and pass a curved needle through the sclerotica, with which I gather together the opaque capsule into a mass, which I then push through the pupil. With the extraction-knife I open the upper or temporal edge of the cornea to a third of its extent. I then introduce a hook, lay hold of the capsule, and either immediately extract it, or if I find this opposed by any adhesion, turn the instrument round

on its axis till the membrane is detached. In one case, in which I found the capsule so strongly adherent to the iris, that I was afraid I might sooner sever the latter from the choroid than extract the capsule, I contented myself with prolapsing the capsule through the wound of the cornea, clearing in this way the pupil, and restoring a very useful degree of vision. Under such circumstances, the iris-scissors might be advantageously employed in dividing the half-detached capsule.

2. *Soft cataracts.* Mr Gibson, of Manchester, appears to have been the first to extract *soft cataracts* through a small incision of the cornea. He was led to adopt this practice from the great length of time which soft cataracts sometimes take to disappear by solution in the aqueous humour, added to the fact, that not only is the patient apt to grow anxious and to lose his health, but the eye to become affected with chronic irritability and inflammation, under this prolonged mode of cure. Mr Gibson first of all freely ruptured the anterior hemisphere of the capsule with the needle, and after two or three weeks, proceeded to extract the pulpy lens. For this purpose he punctured the cornea near its temporal edge with a broad extraction-knife, and if he had any doubt of the capsule having been freely lacerated in the former operation, he directed the point of the knife obliquely through the pupil, so as to make a more free division of the capsule. On withdrawing the knife, part of the aqueous humour, and some portion of the cataract were evacuated. The curette was next introduced through the incision, and towards the pupil; and by that instrument the whole of the cataract was commonly removed by degrees, and the pupil rendered perfectly clear. Its removal was generally much facilitated by gentle pressure with the convex surface of the curette, towards the vitreous humour, whilst the point was inserted through the pupil.

Mr Gibson observes, that it occasionally happens, upon introducing the curette, that a considerable part of the cataract appears too solid for removal, and only a small portion escapes in a pulpy state. The nucleus of the lens is sometimes much more solid than the rest, and will not be readily extracted in this way; yet, much oftener the difficulty arises wholly from the smallness of the aperture in the capsule, so that it allows only an inconsiderable part of the cataract to pass out at a time, the capsule having perhaps been tougher than usual, and not easily lacerated in the preparatory operation with the needle. In such a case, the opening into the capsule may be extended, either by means of the curette, or by the needle commonly used for lacerating the capsule; or, if this membrane appears uncommonly firm, it may be divided with the iris-scissors.

Mr Gibson concludes, that by this operation, the repeated use of the needle may be safely superseded, and the eye exposed to less risk of injury and inflammation. He adds, that in many instances, no traces of inflammation, or of any operation, could be seen on the eye the next day; nor had the iris ever been injured, or even irritated in the slightest degree, by the use of the curette.[9]

This method of removing soft cataract has been adopted by Mr Travers, with the difference, that instead of opening the capsule with the needle passed through the sclerotica, and then waiting for two or three weeks, he begins his operation, having previously dilated the pupil, by a quarter-section of the cornea, dipping the point of the knife into the pupil, and freely lacerating the capsule. The fluid cataract, he states, is instantly evacuated with the aqueous humour; the flocculent cataract, taking an oblong shape, frequently passes out entire; and the caseous cataract piecemeal, through the hollow of the scoop, on gently depressing the margin of the pupil.[10]

3. *Firm cataracts.* Mr Travers,[11] Sir William Adams,[12] and others, have had recourse also to the extraction of *firm cataracts* through a small section of the cornea.

The pupil being previously dilated by belladonna, the steps of the operation are, to slit open the capsule with a small bent needle, introduced through the sclerotica; tilt the lens forward through the pupil; keep it fixed by means of the needle, which is now committed to the charge of the assistant; open the circumference of the cornea to fully one-third of its extent; withdraw the needle; introduce a hook, lay hold of the lens, and extract it.

The opening in the capsule will require to extend to its whole diameter, else the dislocation of the lens will not be easily accomplished. The dislocation is usually effected by pressing with the needle near the lower or upper edge of the lens, so that the opposite edge from that which is pressed upon is tilted forwards through the pupil; and it matters little whether, in doing so, the lens revolves, so that its posterior surface comes to be applied against the cornea, or not. If the operator is satisfied that the capsule is sufficiently opened, and yet fails in bringing the lens forwards by pressing back one or other of its edges, he may withdraw the needle from the posterior chamber, by carrying it under, and hence behind the lens, which he must then attempt to push forwards through the pupil. Retaining the needle in contact with the lens till the section is finished, or even keeping it in the eye till the cataract is extracted, is no doubt of use, as it secures us against the lens falling back into its former situation. At the same time, unless the patient be very still, the needle is apt to lacerate the iris, and cause bleeding into the eye. Some operators, therefore, withdraw the needle immediately after the lens is dislocated. The incision of the cornea is to be executed exactly in the same manner as the semi-circular incision. The hook is to be introduced, flat, between the lens and the iris, as far as the centre of the pupil; the curved point of the instrument is then to be turned forwards, and the cataract laid hold of. The extraction is accomplished without any pressure on the eye, which constitutes the great recommendation of this mode of operating, in cases where we have reason to suspect the hyaloid membrane to be unsound.

§ 3. *Extraction through the Sclerotica.*[13]

At the end of his "Improved method of Opening the Temporal Artery," published in 1783, Dr Butter describes a method of extracting the cataract through the sclerotica, by means of an instrument, similar to that which was afterwards employed for the purpose by Sir James Earle. Dr Butter had tried the method he describes on the dead body only.

Mr B. Bell[14] suggested extraction through the sclerotica as a mode of operating, which was not only practicable, but in which the cornea and iris would be exempt from all direct injury. His experiments on the lower animals led him to believe, that the inflammation induced by an incision through the sclerotica was not more considerable, nor the cure in any respect more difficult, than when extraction was performed in the usual manner. He recommended the opening to be made in the upper part of the eye, the knife being entered about the tenth of an inch behind the cornea, and the incision to be of sufficient size for allowing the cataract to pass. A sharp curved probe was to be introduced, the point of which was to penetrate the lens, which might by this means be removed without any pressure upon the eyeball.

A remarkable case of wound of the eye, attended with evacuation of the lens, led Dr Löbenstein-Löbel to form[15] a favourable opinion of extraction through the sclerotica, but he does not appear to have ever put this operation in practice.

I have already (page 343) related a case, in which I extracted a crystalline lens from under the conjunctiva; it having been propelled, by a smart blow on the eye, through a laceration of the choroid and sclerotica. The opening through these tunics was already healed, the pupil clear, and the retina perfectly sensible. Such facts as this would lead us to pause, before we absolutely reject the operation of extraction through the sclerotica.

I cannot pretend to speak with much precision of an operation which I have only once attempted on the human eye. I should consider it proper, however, to divide the capsule with the needle before opening the sclerotica and choroid with the common extraction knife; to select the upper part of the eyeball for the incision; to make it parallel, not perpendicular, to the edge of the cornea; and to extract the lens with a hook. Of course, pressure on the eyeball in this operation, is altogether out of the question.

It would appear from the testimony of Wenzel,[16] which, however, is given in rather an unfriendly spirit, that Janin attempted extraction through the sclerotica on seven patients in the *Hôtel des Invalides* at Paris, but in all seven unsuccessfully.

For extraction through the sclerotica, Sir James Earle employed a small lancet, moving backwards and forwards between the blades of a pair of forceps. This instrument being introduced through the sclerotica and choroid, the lancet is withdrawn by means of a spring contained within the handle, while the forceps is left behind. The

blades are then opened, and the cataract seized and brought away. Sir James entered the instrument just behind the iris. In the first three operations which he has related, he introduced it in such a manner that the incision ran parallel to the edge of the cornea, and of course divided a considerable number of the choroidal vessels; but in his fourth operation he appears to have introduced the instrument in such a manner that the incision would form a line perpendicular to the edge of the cornea, or, in other words, run parallel to the course of the choroidal arteries. Having retracted the lancet, he then turned the forceps round, so that they might embrace the cataract; a mode of procedure by which he thinks a discharge of vitreous humour less likely to occur. He states, also, that the wound which is made perpendicular to the edge of the cornea heals with the same facility as the other.[17]

The following are some of the advantages, mentioned by Sir James, as possessed by extraction through the sclerotica. The wound need not exceed a fourth of the size of the incision required in the ordinary operation of extraction through the cornea; in the passage of the forceps through the vitreous humour and in the use of them afterwards, not nearly so much derangement of the interior of the eye is produced as attended the employment of the needle in the old operation of couching; as the part through which the incision is made performs no motion, the edges of it remain in contact, and heal with comparative facility.[18]

Quadri[19] of Naples, has put the operation of extraction through the sclerotica more completely to the test than any other surgeon. He has operated on 25 eyes, and on 11 of these successfully, a proportion too small to tempt any one to think of abandoning extraction through the cornea, for the operation through the sclerotica.

The dangers principally to be feared, in extraction through the sclerotica, are bleeding from the choroid, to such an extent as to hide the cataract from view, atrophy of the eye from a profuse loss of vitreous humour, and amaurosis from the injury which the retina is likely to sustain. I have twice seen capsular cataracts extracted through an incision of the sclerotica. In both cases, the loss of vitreous humour was great, and the eye was left in a state of incomplete amaurosis.

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[1] Mémoires de l'Académie Royale des Sciences, Année 1708; p. 311; Amsterdam, 1750.

[2] Mémoires de l'Académie Royale de Chirurgie; 12mo; Tome v. p. 369; Paris, 1787. In 1707, Mery had seen Saint-Yves perform extraction in a case similar to that in which Petit operated in the following year, and to which Daviel refers. Mery was led from the success of Saint-Yves' operation, to recommend extraction through the cornea as a mode of removing cataract worthy of being generally adopted, judiciously remarking "qu'on risque moins à tirer la cataracte en dehors qu'à l'abattre au dedans de l'œuil." Mémoires de l'Académie Royale des Sciences, Année 1707; p. 606; Amsterdam, 1746.

[3] See Raleigh, in Transactions of the Medical and Physical Society of Calcutta; Vol. iv. p. 385; Calcutta, 1829.

[4] When I was a pupil at Vienna, in 1817, it was usual to attribute the invention of the upper section to Santerelli, and to swear, *in verba magistri*, that it was a bad operation. It is mentioned in books, that Wenzel, Richter, and B. Bell practised, or at least recommended, the upper section. The first Wenzel's common operation was a semilateral section, parallel to the temporal and lower edge of the cornea; but in certain cases, as when the lower part of the cornea was leucomatous, he made his section parallel to the nasal and superior edge. In this way he operated, as his son relates, (Traité de la Cataracte, pp. 132, 135; Paris, 1786,) on the Duke of Bedford, and on the celebrated Leonard Euler. All that Richter says on the subject, (Treatise on the Extraction of the Cataract, p. 59; London, 1791) is, that the upper section is practicable. B. Bell had tried the upper section only on some of the lower animals; but he states distinctly (System of Surgery, Vol. iv. p. 238; Edinburgh, 1801) several reasons for preferring it to the common method of making the incision parallel to the lower edge of the cornea.

Santerelli was the first, (Delle Cateratte, p. 79; Forli, 1811) as far as I know, who actually made the section, not semilaterally as Wenzel had done, but at the upper edge of the cornea. This he did at Berlin, in 1795, with a double-edged knife, or broad lancet, the point of which he introduced directly into the anterior chamber, from the middle of the upper edge of the cornea, in the expectation of forming an incision of sufficient extent merely by pressing the instrument on towards the lower edge of the cornea; a method of operating, in which, I know from experience, that it would be impossible to make a section of more than from a quarter to a third of the circumference. This method of Santerelli is a bad one, and is entirely abandoned.

The best operators both of this country and of continental Europe, are at present following exactly the plan recommended by B. Bell, who says, 'The upper 'part of the cornea is cut with the same ease as the under part of it; the same 'instruments being employed, and the surgeon, patient, and assistants being placed 'in the same manner; only in this case the knife must be introduced with the 'cutting edge of it towards the upper part of the eye.'

[5] See a case by Paget, in Edinburgh Medical and Surgical Journal; Vol. ix. p. 280; Edinburgh, 1813.

[6] Quoted from the Bibliothèque Universelle, for October 1829, in the Journal of the Royal Institution for November 1830, p. 191.

[7] Transactions of the Medical and Physical Society of Calcutta; Vol. iv. p. 350; Calcutta, 1829.

[8] On the Treatment of Patients after the Operation for the Cataract; by Jonathan Wathen Phipps; published as an Appendix to Wathen on Fistula Lachrymalis; London, 1792.

[9] Practical Observations on the Formation of an Artificial Pupil; to which are annexed, Remarks on the Extraction of Soft Cataracts, &c. p. 103; London, 1811.

[10] Further Observations on the Cataract; in the Medico-Chirurgical Transactions; Vol. v. p. 406; London, 1814.

[11] Ibid.

[12] Practical Inquiry into the Causes of the Frequent Failure of the Operations of Depression and Extraction, pp. 138 and 283; London, 1817.

[13] Löbenstein-Löbel conjectured that extraction through the sclerotica was the method adopted by Kerkringius, Burrhus, Taylor, and Woolhouse, when they boasted of having restored a young and acute vision to aged people, by removing the corrupted and turbid humours of the eye, and replacing new ones in their stead; but this is very unlikely.

[14] System of Surgery; Vol. iv. p. 246; Edinburgh, 1796.

[15] Edinburgh Medical and Surgical Journal; Vol. xiii. p. 56; Edinburgh, 1817.

[16] Traité de la Cataracte, p. 33; Paris, 1786.

[17] From some experiments which I have made on the lower animals, I am convinced that an incision through the sclerotica, perpendicular to the edge of the cornea, gapes less, and therefore heals sooner, than one parallel to the edge of the cornea. At the same time, it is evident that an incision 5 lines long, which will

be necessary for the extraction of the lens, the mere diameter of which measures 4 lines, must, if perpendicular to the edge of the cornea, implicate the retina.

[18] Account of a New Mode of Operation for the Removal of Cataract; London, 1801.

[19] Annotazioni Pratiche sulle Malattie degli Occhi; Lib. iii. p. 167; Napoli, 1827.

SECTION XI.—DIVISION.

§ 1. *Division through the Sclerotica.*[1]

In the days of Celsus,[2] breaking down the cataract into fragments with the couching needle, was regarded as a proper supplementary step to displacement, when this could not be satisfactorily performed. Barbette, Read, and Maître-Jan, all availed themselves of their knowledge of the fact, that a cataract which had been merely cut up and left in its ordinary situation, would after a certain length of time disappear. Barbette[3] states, that in such circumstances, vision would be restored after seven or eight weeks; Read[4] employs the words *consumed* and *dispersed*, to express the disappearance of the pieces of the divided cataract; Maître-Jan[5] observes that this disappearance, which he styles a *precipitation*, takes place as well in the anterior as in the posterior chamber, and notices its connexion with a laceration of the capsule. Pott[6] appears to have been the first, not merely to make use of the term which we now employ in speaking of the disappearance of the cataract, namely, *dissolution*, but to adopt a laceration of the capsule as a distinct mode of operating, independent of depression.

It is evident, that in this mode of operating, the object is not immediately to remove the cataract, but merely to expose it to a natural means of cure, namely, the solvent action of the aqueous humour. This may be done in two ways; viz. *first*, by destroying the front of the capsule, so that the aqueous humour gains admittance to the lens; and, *secondly*, by dividing the lens into fragments, and pushing these into the aqueous humour. Both of these objects may be attempted at one operation; but it is better to operate twice than to do too much at once, and to confine ourselves in the first operation to little more than the division of the capsule. The caution delivered by Mr Hey is peculiarly applicable to the operation of division. "One principal thing," says he, "to be kept in view by the operator, is to do no harm. If he secures this, he will almost certainly do some good, and often much more good than he expects."[7]

Division through the sclerotica naturally divides itself into four periods. In the *first*, the needle is introduced through the tunics, and into the vitreous humour; in the *second*, the instrument enters the posterior chamber; in the *third*, the anterior hemisphere of the

capsule is divided; in the *fourth*, the lens is cut into fragments, and these are pushed into the anterior chamber.

The pupil is to be dilated by belladonna, in the manner mentioned at page 671.

A bent needle, (*Fig.* 70, page 671) is to be preferred, its edges perfectly sharp, its neck round, and its size rather under than above the measurements stated at the page just referred to.

1*st Period.* The first period of the operation is exactly the same as in depression and reclination. (See page 672.)

2*d Period.* The second period commences with a double motion of the needle, by which it is made to perform a quarter of a revolution on its axis, so that its convex surface is turned forwards, and its concave surface backwards. At the same time its handle is to be carried back towards the temple, and its point forwards, to the interval between the circular edge of the ciliary processes, and the circumference of the lens. The operator now slowly pushes on the needle between these parts into the posterior chamber. He sees its point advancing from behind the temporal edge of the pupil, (*Fig.* 71, page 673) and carries it on through the posterior chamber, till its point reaches the centre of the anterior hemisphere of the capsule.

3*d Period.* The operator proceeds by numerous touches of the instrument, to cut up the anterior hemisphere of the capsule into shreds, to an extent rather exceeding than falling within the natural size of the pupil. The object is entirely to annihilate the central portion of the capsule, and thus allow the aqueous humour free access to the lens. Merely to pierce the capsule, slit it up, or tear it from the front of the lens, would, in all probability, not answer the purpose, because the portions of the capsule thus treated would speedily re-unite, and the absorption of the lens be interrupted. Neither is it desirable to open the capsule in the whole of its diameter, because this would most likely be followed by dislocation of the lens, which would consequently press against the iris, or pass entire through the pupil into the anterior chamber.

The comminution of the capsule is to be effected without exercising much pressure on the crystalline, which might cause separation of the adhesion between the ciliary processes and zonula Zinnii.

If the lens be fluid, it will escape into the aqueous humour and render it turbid, as soon as the capsule is opened; and if soft and friable, portions of it, towards the end of this period of the operation, will generally be observed to break off, and float forwards through the pupil.

If it be the first operation which the cataract has undergone, the needle should be withdrawn as soon as the division of the capsule is completed. It is of great importance, however, that this part of the operation be as completely executed as possible, especially in cases of congenital cataract, both that we may avoid unnecessary repetitions of the operation, and because the capsule is generally much less tough at a first operation than in any succeeding one, and

therefore more easily divided. If merely punctured in a first operation, and left, in an almost entire state, to be acted on by the aqueous humour, admitted through the puncture of the capsule, this membrane is often found on a second operation, to be much tougher and more opaque, or now for the first time opaque, having formerly been transparent. I have especially remarked this in cases of infants, affected with what is termed congenital cataract. Hence the necessity of great attention to the comminution of the anterior hemisphere of the capsule at the first operation.

4th Period. It sometimes happens that the division of the capsule, in the manner and to the extent above stated, is sufficient without any further operation, to procure the absorption of the lens, and the restoration of vision. Much oftener the operation of division requires to be repeated after the interval of two or three months; and at the second operation, particular attention requires to be paid to the breaking up of the lens and dispersion of its fragments.

The needle being introduced as before, the operator begins the division exactly as he began the former operation, lest the shreds of the capsule may in the interval have coalesced, and therefore require to be separated and broken down. Having assured himself of the existence of a sufficient central aperture in the capsule, he next, by gentle movements of the needle upwards and downwards, divides the lens, pushing the pieces, as he proceeds, through the pupil, into the anterior chamber. In breaking up the lens, it is sometimes necessary to move the edge of the needle backwards or towards the vitreous humour; but this direction ought rather to be avoided, in order that the posterior capsule may be left entire, for if it be much injured, it is apt to become opaque, an occurrence rendering necessary new operations, which endanger the organization of the vitreous humour.

It is by no means essential, even for speedy solution, that the pieces of the divided lens be brought into the anterior chamber. Some have been led to think, that solution is accomplished fully as quickly, when the lens, stript of its capsule, is left in its natural situation. No doubt, the greater quantity of the menstruum by which the solution is to be effected lies in the anterior chamber, and therefore a comminuted lens will there be brought more thoroughly into contact with the aqueous humour than in the posterior chamber; but, on the other hand, it is urged that this menstruum is secreted chiefly, if not entirely, in the posterior chamber, and that it is possible it may possess more of the solvent power when just flowing from the capillaries which secrete it, than after it has passed forward through the pupil, and is about to be absorbed. Others have been of opinion, that the removal of the opaque lens, after the capsule is opened up with the needle, is to be attributed perhaps as much to the action of the absorbents of the lens itself, stimulated by the presence of the aqueous humour, as to the operation of this fluid in the way of a menstruum.[8]

The facility with which the fragments of the divided lens are

scattered by the needle, does not depend so much on its consistence as on the degree of coagulation which it has undergone. In patients about the age of 25, we not unfrequently find the lens so soft that the needle passes easily through it in every direction, but at the same time so glutinous and tenacious, that the fragments can be separated with difficulty; whereas in patients of 35, the lens is generally more friable, and breaks under the needle into scales and flocculi. By exposure, however, to the aqueous humour for a few weeks, the glutinous lens becomes more completely coagulated, and then its fragments prove less cohesive. Even the hard lens of an old person, if exposed for some time to the influence of the aqueous humour, occasionally becomes brittle, so that at a second operation with the needle, (the first operation having been devoted to the destroying of the anterior hemisphere of the capsule,) we find the lens to scatter into fragments. This is an occurrence, however, too rare, to vindicate us in adopting division as a general mode of operating on the hard cataract of old persons.

What length of time is generally required for the cure of cataract by absorption? To this I am inclined to answer, that we have no evidence to prove that the capsule is ever absorbed, whether it be in the transparent or in the opaque state; and that as for the lens, the rapidity with which it is dissolved, depends partly on its consistence, and partly on the completeness with which it is exposed to the aqueous humour. If in a person below 35 years of age, the central portion of the anterior hemisphere of the capsule be thoroughly destroyed with the needle, and if no inflammation follow the operation, the lens may be completely dissolved and absorbed in six or eight weeks. Of course, the semi-fluid lens of the child will be absorbed in a few days, or even in a few hours, while the hard lens of a person of 55 or 60 may remain unchanged for several months. In an individual of about 30 years of age, in whom I freely divided the anterior hemisphere of the capsule, very little absorption seemed to take place for the first six weeks. In the course of the next two weeks, the lens was completely dissolved. Dr W. Soemmerring made a single incision into the opaque capsule of a boy, of four years of age, affected with congenital cataract. The lens remained without apparent change for half a year. Absorption then commenced, and rapidly proceeded.[9]

We constantly observe, that solution and absorption go on much more rapidly, when the eye is free from inflammation or irritation. Indeed during an attack of pain, with redness and epiphora, solution and absorption seem to cease, but are renewed whenever the irritation subsides, or the inflammation is overcome. We explain this, partly by the well-known fact, that over-distention of the blood-vessels is found to be inconsistent with a free action of the absorbents, and partly by the circumstance, that although there may be no evident effusion of lymph behind the pupil, there is always a tendency in internal ophthalmia, to such an effusion, and, of course, a disposition to close up and repair the injured capsule. This effort

of nature, however admirable its design, we must in this instance endeavour to counteract, in the first place, by as complete a division of the capsule as is possible, and, secondly, by a strict antiphlogistic after-treatment.

The opinion above stated, that the capsule, so far as we know, is insoluble, is, I am aware, in contradiction to what has usually been maintained upon this point. The capsule in the transparent state we never see; its shreds are invisible, from the very circumstance of their transparency. The membrane too is highly elastic, and upon being divided, rolls itself up like a bit of moistened gold-beater's leaf. But if inflammation occurs, the capsule becomes opaque, and, unless the inflammation is speedily subdued, will continue permanently so. The opaque shreds in the inflamed state tend also to reunite, and thus give rise to a secondary capsular cataract. Subdue the inflammation by bloodletting, mercury, and other appropriate remedies, and the opaque state of the capsule subsides or disappears. Neglect it, and not merely does the opacity become permanent, but however much the capsule may afterwards be divided, its shreds never disappear, except by displacement. They may be pushed aside, a central aperture cleared, and vision restored; but portions of opaque capsule will be visible for life behind the edge of the pupil, when brought under the influence of belladonna, and the minute shreds which fell down into the anterior chamber, will lie there without undergoing the slightest change. It is probable, that the return of transparency, after inflammation of the capsule is overcome, has given rise to the erroneous opinion that this membrane is susceptible of solution in the aqueous humour.

Modifications of division through the sclerotica, according to varieties of cataract. 1. When the lens is fluid, it will of course flow through the wound of the capsule into the aqueous humour. This renders it difficult to execute the division of the capsule with precision. It is desirable, however, that the centre of it should be freely lacerated. The turbid aqueous humour is generally absorbed in a few days, and not unfrequently in the course of a single day. In some rare cases, the effusion of the opaque lens into the aqueous chambers, excites considerable inflammation.

2. The appearances of the opacity, added to the age of the patient, should in general be sufficiently indicative of hard cataract; and in cases of this sort, division ought never to be tried. Should the operator, however, have deceived himself, supposing the lens to be soft, but on touching it with the needle discover it to be hard, the best plan which he can follow is to bring the lens through the pupil, open one-third of the circumference of the cornea, and extract.

3. When the pupillary edge of the iris is adherent to the capsule, which in this case is always more or less opaque, we may endeavour with the point or edge of the needle cautiously to separate the points of adhesion, particularly if they are but few in number, and having effected this, proceed to the division of the capsule in the usual way.

If the adhesion comprehends the whole edge of the pupil, separation is scarcely to be accomplished; but if the pupil is of a medium size, it is not necessary for the restoration of sight that the iris should be freed from its attachment to the capsule. Enough of the capsule can in this case be divided to admit the aqueous humour freely to the lens, and we probably run less risk of renewed iritis when we confine ourselves to the clearing away of the centre of the capsule, than were we to attempt the separation of the morbid adhesions of the iris.

After-treatment. Except in continued dilatation of the pupil, the after-treatment does not differ from what has already been recommended as advisable after the operations of displacement. If the pupil is kept under the influence of belladonna, the fragments of the divided lens are in a great measure prevented from irritating the iris, and thus iritis is warded off. It is dangerous to allow the pupil to contract, before the cataract is dissolved. The eyebrow and eyelids, therefore, are to be smeared with the extract of belladonna morning and evening, till all redness and irritation consequent to the operation have disappeared, after which we may advantageously substitute a strong aqueous solution of the extract, filtered through paper, and made lukewarm, of which a little is to be dropped into the inner corner of the eye, the patient opening the lids and allowing the solution to spread over the conjunctiva. This is to be continued morning and evening till the cataract has disappeared, the patient meanwhile shading the eyes, lest the influence of the light prove hurtful.

Accidents during and after division through the sclerotica. Many of these are exactly similar to those which attend the operations of displacement, and need not again be particularly insisted on. A few are peculiar.

1. The needle, instead of entering the posterior chamber, sometimes slips between the lens and the capsule. As it is impossible with the needle in this situation, to divide the capsule in a proper manner, the operator ought to withdraw the instrument a certain way, and then repeat the second period of the operation, taking care to bring the point of the needle in front of the capsule. It is a bad practice, to proceed to divide the lens, and leave the capsule almost untouched.

2. Should it happen, in consequence of an improper use of the needle, that the lens bursts from the capsule, and passes through the pupil into the anterior chamber, the cornea should immediately be opened, and the lens extracted.

3. If we have divided the capsule in a case of hard cataract, the surface of the lens may dissolve, leaving a firm nucleus. This gradually diminishes in bulk. I have known the nucleus undissolved a year after the operation. Falling forwards into the anterior chamber, the small hard kernel may cause great irritation, neuralgia, and inflammation. It may become united to the iris by inflammation, so that if we delay opening the cornea for its extraction, when we

come at last to do this, it cannot be removed, having become organized and incorporated with the iris.

4. If the hyaloid membrane is in a dissolved state, the lens and capsule, hitherto kept in their place by the adhesion of the zonula Zinnii to the ciliary processes, are apt, on being touched with the needle, suddenly to sink to the bottom of the vitreous humour. In this case, the cataract ought immediately to be laid hold of with the needle, brought up into its former place, pushed through the pupil, and extracted through a small section of the cornea.

5. A certain degree of inflammation may always be expected to follow division through the sclerotica; reparative inflammation of the capsule, spreading in some degree to the iris, and if not timely checked, producing opacity of the capsular shreds, closing up the central aperture which has been formed by the operation, interrupting in various ways the process of dissolution of the lens, and perhaps going the length of coarctation of the pupil and adhesion of the iris. In two cases in which I operated, suppuration of the capsule took place, the matter exuding partly into the anterior chamber. Belladonna, bloodletting, and calomel with opium, are the means to be employed to avert these dangers. In one of the cases just referred to, I opened the cornea, and allowed the matter to escape. The other case was greatly benefitted, by making the mouth very sore with mercury.

6. Has the process of solution and absorption of the lens no exhausting effects upon the internal parts of the eye? Are these parts left as sound, after this process has been accomplished, as after extraction, in neither case inflammation having occurred? To these questions, I must answer, that after the process of solution and absorption is completed, we frequently observe undeniable signs of the internal textures of the eye having suffered, not from inflammation apparently nor from irritation, but rather from exhaustion. The nutritive, or regenerative power of the eye, appears to be weakened. The iris becomes paler and more flaccid than natural, the pupil smaller, and its motions less vivid; while, in some cases, the wasting of the eye extends more deeply, the vitreous humour shrinks, and the retina loses its sensibility.

§ 2. *Division through the Cornea.*[10]

It has been conjectured that this is a very ancient method of curing cataract. Galen mentions[11] a tradition, that for the operation for cataract, man was indebted to what was observed to happen to the goat, which after pricking his eye against a sharp reed, retained the power of sight; whence it has been thought that the first operation practised for cataract may have been a division or punctuation of the lens through the cornea.

Albucasis tells us[12] that he had been informed there were some who pumped out the cataract through a hollow needle. Now, in cases of fluid cataract, there is no doubt that the *gutta opaca*, in which the Arabians believed cataract to consist, might be discharg-

ed through a tube introduced, I presume, through the cornea; but even when the cataract was not fluid, and when only the aqueous humour was discharged, a very slight wound through the anterior hemisphere of the capsule with the end of the tube, would frequently be sufficient to produce a cure, by the admission of the aqueous humour. We shall presently see that the operation proposed by Conradi amounted to little more than such a perforation of the capsule.

There is an insulated case recorded by Mayerne, in which a female oculist appears to have cured a cataract in a young person, by the introduction of a needle through the cornea.[13] This case is generally considered as the earliest example of an attempt to procure the solution of the lens by puncturing the capsule through the cornea. It is, however, not very evident what was the intention of the operator, and, except from the circumstance of its being placed in a chapter *De Suffusione*, we should not have known that it was a case of cataract at all.

Gleize deserves to be mentioned in a history of the operation of division through the cornea, although his claims have been strangely exaggerated. It happened that a patient, on whom he was about to perform extraction, made an involuntary motion with her head, just as the knife penetrated the cornea, so that the knife slipped out, and was followed by the aqueous humour. Instead of enlarging the incision, it occurred to the operator, that he might depress the cataract through the wound of the cornea, which he accordingly did. He says nothing about dividing the cataract, or exposing it to solution in the aqueous humour.[14] His successful depression in this instance led him, however, to recommend a similar mode of operation in other cases; namely, that having dilated the pupil by belladonna, the operator should make an incision at the edge of the cornea, introduce a needle and divide the capsule circularly, depress the lens if hard, extract it if soft, but leave any fragments which might be detached from it, or even the whole lens if it could neither be depressed nor extracted, to be dissolved by the aqueous humour, an event which he says occupies 20 or 30 days, or longer.

The merit of first proposing a distinct method of operating by division through the cornea, belongs to Conradi, a surgeon at Nordheim in Hanover. He at once passed a needle, or rather a small lancet-shaped knife, through the cornea, opened the anterior hemisphere of the capsule, and then withdrew the instrument, leaving the cataract to be dissolved; an operation which is certainly one of the simplest yet proposed for the cure of this disease, being executed with a single instrument, and interesting only the cornea and the capsule.[15]

The operation of Conradi was quickly put to the test in different parts of Germany. In many cases, it proved successful; in others, the punctured incision of the capsule was found to heal up, and thus the solution of the cataract to be interrupted. This led Buchhorn, of Magdeburg, to add two important steps to the operation of

Conradi; namely, to divide the lens as well as the capsule, and to bring forward the fragments of the cataract into the anterior chamber with the flat side of the needle.[16] The division of the lens, and the introduction of its fragments into the anterior chamber, were supposed directly to hasten the solution of the cataract and the consequent restoration of sight. The success, however, of this method depends chiefly upon the degree in which the anterior hemisphere of the capsule is divided. If this part of the operation be so completely effected, that the remains of that membrane cannot afterwards unite, then the solution of a cataract of ordinary consistence is certain, even should it be left entire, and in its natural situation.

Division through the cornea comprehends three periods; viz. *first*, the introduction of the needle; *secondly*, the division of the capsule; and *thirdly*, the division of the lens and scattering of its fragments.

Whatever form is given to the needle, it ought to be smaller than that used for division through the sclerotica, as in the present case it has to operate through the pupil, and often in the eyes of infants. The neck must be round, and of such a degree of thickness as shall fill the wound made by the bent part of the instrument, and so prevent the aqueous humour from escaping.

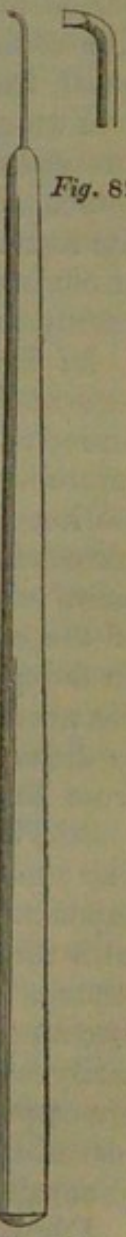

Fig. 82.

I consider the needle recommended by Dr Jacob[17] to be the best, (*Fig.* 81,) combining the advantages of a small blade, with great strength and fine temper, inflicting so minute a wound that no mark remains in the cornea, capable of effectually opening up the texture of the lens, and from its conical form, not permitting the aqueous humour to escape during the operation.

It is made out of a common sewing needle, of the size known as No. 7, being about $\frac{1}{24}$th of an inch in thickness. The point is turned to the requisite curve by means of a pair of pliers, or the ward of a small key; of course without heat, which would destroy the temper. All needles are not so soft as to be bent thus cold; there may not be one in ten of this temper, but, when once turned, such a needle retains the curve without any danger of bending or breaking, and possesses a degree of strength and temper never observed in needles separately forged and finished by the cutler. After having received the requisite curve, the point should be ground flat on each side, on a fine hone, and carefully examined with a magnifying glass to ascertain that it is perfect. (See magnified view, *Fig.* 82.) The needle, held in a pair of pliers, is now to be run down into a cedar handle, leaving only half an inch of blade. If the blade be left longer, it will yield and spring when opposed to a resistance. A needle, thus constructed, will retain its point for a great length of time.

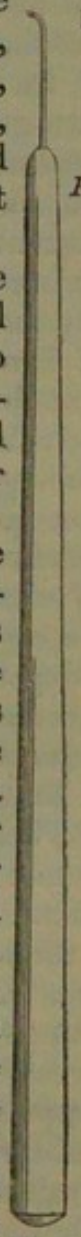

Fig. 81.

1*st Period.* The pupil being fully dilated by belladonna, and the

patient seated on a low chair, or laid along upon a table, the surgeon stands behind him, raises the upper eyelid, and brings the point of the needle within a very short distance of the eye. When the cornea is brought into an advantageous position, he suddenly strikes the needle into it, at the distance of not less than $\frac{1}{10}$th of an inch from the sclerotica. The point of the needle once fastened in the cornea, the surgeon has complete command of the eye; no action of the muscles can disengage it, and there is no danger of the needle slipping into the anterior chamber.

The operator now pushes the needle through the cornea, which frequently yields like wet leather, and the eye is pressed so much aside that the pupil is hid. If the surgeon does not steadily push the needle forward, whatever resistance he may experience, he will find, when the eye returns to its proper position, that the point of the needle is still merely entangled in the cornea. This also is the period of danger to the iris. If the operator does not keep the flat side of the needle toward that membrane, and the point toward the pupil, he will be very liable to injure the iris.

Two great advantages of Dr Jacob's needle result from the very circumstance which produces the difficulty in its introduction. Its conical form, causing it to become wedged in the cornea, prevents the aqueous humour from escaping, and gives the surgeon a power of controlling the eye, which defies every effort on the part of an unruly patient.

2*d Period.* The needle being fairly entered, so that its point is seen at the opposite side of the pupil, the operator turns the point directly back, and proceeds to tear open the capsule, picking and scratching the surface of the crystalline with a rotatory or drilling motion of the instrument. This he should do with the needle turned first in one direction, and then in another. He will find it easy, in this way, to reduce to minute fragments the central portion of the capsule, in an extent equal to the natural size of the pupil. In doing this, he takes care not to raise the capsule on the point of the needle, which, by rending the membrane across, might give rise to dislocation of the lens, and would at least prevent the division from being accomplished in a satisfactory manner.

3*d Period.* If the lens is soft and friable, fragments of it fall like snow into the anterior chamber, as the surgeon comminutes the capsule. When he observes this, he may proceed to deal very freely with the lens, twirling the needle round so as to drill away its substance. A cataractous lens is sometimes so soft, that it falls almost into a powder under the needle. In such cases, the fragments necessarily fall into the anterior chamber, so as to fill it half way up, and are rapidly absorbed without producing inflammation. Such, observes Dr Jacob, are certain lenticular cataracts of a blue tint, not generally found in old persons.

Division generally requires to be performed more than once, and in the second and subsequent operations, it is the comminution of the lens which is to be chiefly attended to, unless at the first opera-

tion the formation of a sufficient central aperture in the capsule has failed. When this has been the case, the division of the capsule must be repeated, then the lens broken up, in the manner already mentioned, and the fragments brought forward into the anterior chamber. If the fragments be larger than the head of a common pin, they are liable to produce inflammation by pressing on the iris, which pressure can be obviated only by keeping the pupil completely dilated by belladonna. No rule can be given regarding the periods at which the operation should be repeated. Dr Jacob observes, that "while the broken lens lies well in the posterior chamber, without pressing on the iris, the operator has reason to congratulate himself, and it is only when he has ascertained that no change is taking place in the cataract, that he is called upon again to disturb it. He should be particularly cautious not to repeat the operation while any trace of inflammation exists."

As in division through the sclerotica, the posterior hemisphere of the capsule and the vitreous humour ought to be spared as much as possible; and in the operation through the cornea, this can be done more easily than in division through the sclerotica.

In withdrawing the needle, the surgeon has to encounter the same description of difficulty which attends its introduction. It is tightly held by the cornea, requiring to be turned on its axis in order to extract it, as an awl is drawn from leather.

The *after-treatment* is the same as when division has been performed through the sclerotica.

Modifications of division through the cornea, according to varieties of cataract. 1. The fluid cataract is to be treated as has already been recommended (pages 675 and 709) on other occasions; but the hard cataract cannot be managed so easily as if the needle had been passed through the sclerotica. Some of the German operators recommend reclination to be immediately performed when the lens proves to be hard, but I should judge it better, having carefully comminuted the capsule, to withdraw the needle, and allow the lens to be acted on by the aqueous humour. After six or eight weeks, we shall probably find the lens softened and fit for being broken up. If it does not appear so, it may be extracted.

2. It sometimes happens that as the surgeon is comminuting the capsule, or opening up the texture of the lens, the latter falls into a number of large fragments, which come forward into the anterior chamber. These may be taken up on the point of the needle, and forced back out of the way of the iris, or if sufficiently soft, they may be divided by pressing them against the back of the cornea with the convex edge of the needle.

3. In certain cases, the pupil is found almost closed, and adhering to a small cataract of nearly cartilaginous hardness. Dr Jacob has introduced his needle in such cases, and with the point destroyed the adhesions between the margin of the pupil and this hard mass, which he has then placed in the anterior chamber, and removed through an opening in the cornea.

4. From the firmness of its point, and the ease with which it can be turned and twisted in every direction, Dr Jacob's needle enables the surgeon to deal most effectually with an opaque capsule. He may pick it, with the point of the instrument, from any attachment it may have formed to the iris, or if it hangs floating, he may entangle and detach it, by pulling or twisting.

Accidents during or after division through the cornea. 1. It sometimes happens that just as the needle passes through the cornea, the dilated pupil suddenly contracts. This will happen very readily if the anterior surface of the iris is touched with the needle, but it sometimes takes place before the point of the instrument is fairly within the anterior chamber. After a minute or two, the pupil generally expands again, so that the operation may be proceeded with. If it continues much contracted after some minutes, the needle must be withdrawn; and on some future day, another attempt may be made, giving the pupil every chance of keeping dilated, by using the belladonna both on the day previous to the operation, and about an hour before it is performed.

2. Should the needle be ill adapted for accurately filling the wound of the cornea, the aqueous humour is apt to escape, one of the consequences of which is that the iris advances towards the cornea, and folds itself round the needle, so that it is difficult, if not impossible, to proceed with the operation. In this case, the operator should either immediately withdraw the needle, or merely open the front of the capsule by a single scratch with its point, and then withdraw it, taking care to supply himself with a better needle before attempting the operation a second time.

The advancement of the iris, however, is not the only bad consequence of the loss of the aqueous humour. The lens also is apt to start forward, and sometimes even bursts from the capsule. Under these circumstances, it is advisable immediately to extract the lens through a small section of the cornea; for when left in this state, it presses against the pupil, and, if hard, may give rise to severe inflammation of the iris, and even of the cornea.

Even a soft cataract, in a young person, left pressing against the iris, and the latter in contact with the cornea, I have known to be followed by severe inflammation, ending in contracted and adherent pupil. In such circumstances, it may be weeks before the iris resumes its natural place, or any aqueous humour occupies the anterior chamber.

3. If a hard lens be dislocated from the capsule, in consequence of the needle sticking in it, the lens may be placed in the anterior chamber, and immediately extracted.

4. Division through the cornea is sometimes followed by corneitis, which is generally attended by inflammation of the iris. The cornea loses its lustre, and its internal surface, probably from effused lymph, sometimes becomes of a yellowish colour. The aqueous humour also assumes a turbid appearance, so that the state of the iris can be discerned with difficulty. When the inflammation sub-

sides, and the cornea and anterior chamber become clear, the iris is probably observed to be retracted, the pupil irregular, and its edge adherent to the remnants of the capsule, which are of a whitish colour, forming a secondary capsular cataract. It is a very common result of division, either through the cornea or through the sclerotica, that the capsule, transparent at the time of the operation, becomes opaque, requiring to be removed out of the axis of vision by a subsequent operation. The bad effects of inflammation of the cornea, iris, and capsule, must be obviated as much as possible by blood-letting, calomel with opium, counter-irritation, and belladonna. The attack is sometimes so acute as to require repeated general blood-letting. In other cases, the inflammation is comparatively slight, continuing for months, and perhaps scarcely attracting attention, except from those who have been put on their guard against this chronic form of corneitis and iritis.[18] Scrofulous iritis in young persons is sometimes very troublesome after division through the cornea, and is apt to end in closure of the pupil.

If the operation of division be attempted on the eyes of old persons, arthritic ophthalmia is liable to follow, and will resist almost every method of cure. The pain of the eye and head continues unabated, notwithstanding depletion, counter-irritation, mercury, and opium. The patient gets little or no rest, day nor night. The redness is not intense; there is a very distinct bluish-white ring round the edge of the cornea; the lens becomes of a green colour, and appears swoln; and the retina is soon rendered totally insensible. In such a case, it is advisable, merely as a means of relief from pain, to extract the lens.

5. A very singular consequence of division through the cornea has been described by Dr Ammon,[19] namely, an infiltration of fluid cataractous matter into the substance of the cornea, rendering it white and swoln, and ending in its ulceration and complete destruction. When such an infiltration takes place, which in Dr Ammon's case it did in the course of the day on which the operation was performed, he recommends opening the cornea as in extraction.

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[1] The Germans, feeling no wish to rob Mr Pott of his fair claims, generally call this *Die Pott'sche Operationsmethode.*

[2] 'Si subindè redit, eadem acu magis concidenda, et in plures partes dissipanda 'est.' Celsus de Re Medica; Lib. vii; Pars ii; Cap. i; Sect. ii.

[3] 'Etiamsi sufficienter depressa haud erit cataracta, visum tamen sæpe post 'septimanas septem vel octo rediisse, in variis observavi, modo in partes varias 'divisa fuerit.' Pauli Barbette Opera Chirurgico-Anatomica, p. 66; Lugd. Batav. 1672.

[4] Short but Exact Account of all the Diseases incident to the Eyes; London, 1706.

[5] Traité des Maladies de l'Œil, p. 186; Troyes, 1711.

[6] 'I have sometimes, when I have found the cataract to be of the mixed kind, 'not attempted depression: but have contented myself with a free laceration of 'the capsula; and having turned the needle round and round between my finger 'and thumb, within the body of the crystalline, have left all the parts in their 'natural situation: in which cases I have hardly ever known them fail of dissolving 'so entirely as not to leave the smallest vestige of a cataract.' Pott's Chirurgical

Works; Vol. iii. p. 156; London, 1808. Mr Pott first published his remarks on the Cataract in 1775.

[7] Practical Observations in Surgery, p. 72; London, 1803.

[8] De la Garde's Treatise on Cataract, p. 51; London, 1821.

[9] Beobachtungen über die organischen Veränderungen im Auge nach Staaroperationen, p. 58; Frankfurt am Main, 1828.

[10] *Keratonyxis* of the Germans; from κέρας, *cornu*, whence *cornea*, and νύττω, *I puncture*.

[11] 'Τίνα δὲ ἐκ περιπτώσεως φασὶ ἐπινενοῆσθαι ὡς τὸ παρακεντεῖν τοὺς ὑποκιχυμένους ἐκ τοῦ 'περιπεσεῖν αἴγα, ἥτις περιχυθεῖσα ἀνέῳξεν, ἐξυσχοίνου ἐμπαγείσης εἰς τὸν ὀφθαλμόν.' Galeni Εἰσαγωγὴ ἢ Ἰατρός. Opera, Vol. iv. p. 371; Basileæ, 1538.

[12] 'Et jam quidem pervenit ad nos de quodam ex illis qui sunt de Alayrach, 'quia [qui] dixit quod factum fuit in Alayrach magdaham perforatum quo sugit 'aqua [aquam]. Verum ego non vidi aliquem in terra nostra qui fecerit illud, 'neque legi illud in aliquo ex libris antiquorum et est possibile ut sit illud novum, 'et istae sunt formæ specierum magdaham.' [Here Albucasis gives three figures.] 'Fiant formæ prædictæ ex ære, et sint extremitates earum subtiles, sit triangulata 'extremitas acuta.' Methodus Medendi, autore Albucase, p. 68; Basileæ, 1541.

[13] 'Mulier Angla, oculista, vidente *My Lord Rich*, filio Comitis *Warwick*, 'acu aperuit corneam supra pupillam, et *humorem Aqueum* exhausit sive effluere 'sivit, qui turbidus et obscurior factus, visionem imminuerat, ita ut æger quasi 'per velum se omnia confusè cernere crederet. Post humoris effluxum oculus 'concidit. Applicata remedia, imperata quies in tenebris; prospectum inflam-'mationi. Aliquot pòst diebus postliminio succrescente humore Aqueo, qui est 'excrementitius, non pars corporis, et qui reparari potest; intumuit, sive repletus 'oculi globus; punctura ejus occlusa et consolidata, nullâ remanente cicatrice. 'Restituta visionis acies, et perfectè curatus fuit æger.' Praxeos Mayernianæ Syntagma, p. 84; Londini, 1690.

[14] Nouvelles Observations pratiques sur les Maladies de l'Œil, p. 118; Orleans, 1812. Either the original edition, published in 1786, contains a very different account of the case referred to in the text, or Buchhorn is incorrect in stating that through the wound Gleize divided the lens and capsule, that the lens dissolved in 20 days, and that Gleize adopted this as a successful mode of operating. On the contrary, it was depression which Gleize performed in the case referred to, and he prefers, when the cataract is soft, that it should if possible be extracted, "pour eviter la longueur de sa dissolution."

[15] Conradi published an account of his mode of operating in 1797, in the 1st volume of Arnemann's Magazin für die Wundarzneykunst.

[16] Buchhorn de Keratonyxide; Halæ, 1806. Die Keratonyxis eine neue gefahrlosere Methode den grauen Staar zu operiren; Von W. H. J. Buchhorn; Magdeburg, 1811. Buchhorn was the first who gave the name of *Keratonyxis*, or *punctio corneæ*, to this method of operating.

[17] Dublin Hospital Reports, Vol. iv. p. 214; Dublin, 1827.

[18] See Schindler de Iritide Chronica ex Ceratonyxide; Vratislaviæ, 1819.

[19] Zeitschrift für die Ophthalmologie; Vol. i. p. 127; Dresden, 1830.

SECTION XII.— CHOICE OF AN OPERATION FOR CATARACT; INDICATIONS AND CONTRA-INDICATIONS FOR THE DIFFERENT MODES OF OPERATING.

When a case of cataract presents itself, which there is no likelihood of relieving except by an operation, the honest and intelligent practitioner will ask himself, Is this a case for division, or ought I to venture extraction, or ought I to content myself with displacement?

He will be guided in his answer, partly by the kind of cataract before him, and the kind of eye in which the cataract exists, and partly by the degree of confidence which he has in his own powers and experience as an operator. So far as the mere dangers likely to accrue from the operations are concerned, the following is the order in which I am inclined to arrange them, placing the safest first, and the most objectionable last; Division through the sclerotica, division through the cornea, extraction through the upper half of the cornea, extraction through the lateral half, extraction through the lower half, extraction through a small section of the cornea, reclination through the sclerotica, reclination through the cornea, depression through the sclerotica, depression through the cornea, extraction through the sclerotica. But were the question put to me in this form, Suppose you were the subject of cataract, which operation would you choose to submit to? I would answer, Extraction by an experienced extractor, in the upper half of the cornea. This, successfully performed, restores vision the soonest, and leaves the healthiest eye, and the one most likely to be long useful.

I hold it unnecessary, after what has been said in the foregoing sections, to discuss minutely the merits of each of the operations, but the following general remarks may not be unworthy of attention.

I. As the success of *division* depends on the solution of the fragments to which the cataract is reduced, and that within a moderate space of time, and without any injurious irritation of the eye, this method of operating is contra-indicated whenever the lens is of hard or firm consistence, or the capsule greatly thickened or very tough. Such cataracts are either incapable of being divided with safety to the neighbouring parts, or if divided are incapable of being dissolved. The cystic cataract is evidently improper for division, on account of the thickness of the capsule, even although the lens is fluid; as is also that variety of cataract, which we occasionally meet with in old persons, in which the central half, or more than the central half, of the lens is hard, while the superficial laminæ are soft or reduced to the state of a fluid.

It is only where the lens is throughout caseous or fluid, and the capsule either transparent, or at least not greatly thickened, that we can with propriety have recourse to division. Hence it is, that in almost all cases of cataract in children and young persons, this is the operation which is to be preferred, while in old persons it rarely answers.

In the following cases, division appears to be peculiarly indicated.

1. When the one eye is blind from cataract, and in the other the disease is merely incipient. By the time that the cataract is fully formed in the second eye, the divided lens may already be dissolved in the other.

2. In weakly, timid, or irritable persons, and in those who are subject to convulsive or nervous diseases, extraction or displacement, both of which are severe in comparison to division, would be improper.

3. When the surgeon is timid, and unaccustomed to operate on the eye. The errors which such a person is likely to commit in performing extraction or displacement, may be fatal to the patient's sight, but in division he can do comparatively little harm, and if his first attempt fails to remove the cataract, the operation can be repeated.

Division must be regarded as an excellent mode of curing those varieties of cataract which are susceptible of solution; whereas if the operator employs division in cases unfit for this mode of cure, disappointment will be the result, and a false estimate will probably be formed of the merits which the operation really possesses. If we have recourse to division for the removal of the hard cataract of old people, we shall not merely waste time, but expose our patients to such evil consequences as may unfit them for deriving advantage from any other mode of operating. Nor ought it to be concealed that the cure of cataract by division, even in young subjects, often causes an atrophy of the eye to commence, unfavourable to the healthy resumption of its functions, an effect very uncommon after extraction. The labour of absorption necessary to remove the lens seems often to injure the eye. The vitreous humour, lacerated probably in the operation, gets soft; and without the formation of any adhesions, the pupil becomes greatly contracted. We often see eyes after extraction, almost perfect, except that they want the lens; rarely after division.

With regard to the comparative merits of division through the cornea or through the sclerotica, as the cornea is insensible, the former operation is the less painful. There is of course no danger of injuring the ciliary processes or retina when the needle passes through the cornea; the anterior hemisphere of the capsule is also certain of being more or less completely divided in this method, while the posterior is more likely to escape being destroyed than in the operation through the sclerotica, the hyaloid membrane is left entire, and the sensibility of the retina is less liable to be endangered by the violence done to the neighbouring textures. These advantages are, in some measure, counterbalanced by the danger of injuring the iris with the needle passed through the cornea, the liability of corneitis to occur after this mode of operating, the danger of iritis being brought on by the iris advancing into contact with the cornea from the loss of aqueous humour, and, should the lens unexpectedly prove hard, the difficulty of bringing it forward through the pupil for extraction.

II. That *extraction* is the only proper mode of removing a hard cataract, is an assertion, of the truth of which those who have had any considerable experience in the treatment of eye-diseases, and have been able to think for themselves on the subject, are as firmly convinced, as they are that soft cataract may safely and satisfactorily be cured by division. To attempt the cure of hard cataract by division, would be worse than useless. When no particular contra-indication, therefore, exists to extraction, we have recourse to that

operation; and the only points remaining for our consideration are the contra-indications to extraction which may exist even when the cataract is hard, and the comparative advantages of a large or small section of the cornea.

The following are some of the chief contra-indications to extraction through a semicircular incision of the cornea. They of course may be regarded so far, as indications either for extraction through a small section, or for displacement.

1. When the cornea is flat, the iris convex, the eyeball small, and deep in the orbit, the edge of the orbit prominent, or the eyelids short, so that the palpebral opening is contracted, it is difficult and often impossible, to make a semicircular section of the cornea in the usual manner.

2. I have already (page 633) noticed the objection to extraction, founded on the presence of an arcus senilis.

3. The existence of adhesions, either between the cornea and iris, or between the iris and the crystalline capsule, generally debars the operation of extraction; for in the former case, it is not likely that the section could be executed without dividing the iris, while in the latter, the division of the capsule and exit of the lens are prevented.

4. If the pupil is very small, (*myosis*,) and even when under the influence of belladonna dilates to an inconsiderable extent, the last mentioned objection will still occur to prevent us from attempting extraction.

5. A fluid state of the vitreous humour is a very sufficient objection to the ordinary operation of extraction, which ought therefore never to be attempted unless the eyeball presents to the touch nearly its natural degree of firmness. If soft and boggy, the vitreous fluid is deficient in quantity, and the hyaloid membrane in general destroyed; but much more frequently a dissolved state of the hyaloid membrane is attended by a superabundant quantity of the vitreous fluid, and an extraordinary degree of firmness of the eyeball. In either of these cases, the cataract, clinging through the medium of the zonula Zinnii to the ciliary processes, may easily be displaced by the needle. The least touch is in general sufficient to make it sink to the bottom of the eye, and even without any operation, a spontaneous displacement of this sort, a natural cure of cataract, sometimes occurs, to the astonishment and delight of the patient.[1]

The restoration to sight in such cases, whether effected by the needle, or by a natural solution of the connexion between the cataract and the ciliary processes, is seldom of long continuance. On looking into the eye, the cataract is seen bobbing about in the vitreous fluid, the iris, if not previously tremulous, now becomes so, and in the space of a few weeks or months the retina is found to be insensible. Once on touching such a cataract with the needle, I observed that it separated from the ciliary circle, except towards the nose, where it continued to hang as if on a hinge. When the patient looked upwards he saw tolerably well, and could read the names above the shop-doors with facility, for in such a position of his head the

cataract floated back into the vitreous fluid and left the pupil clear, but the instant he attempted to examine any object which required him to lean forward, such as reading a book lying on the table before him, he saw none, the cataract moving forward and shutting the pupil exactly like a door or lid. This patient continued for some time to show himself at the Glasgow Eye Infirmary, but at his last visit he was totally blind, the lens had separated from its hinge, the pupil was clear, the cataract floated behind the lower edge of the pupil, the iris was tremulous, the eyeball very hard, and the retina insensible. In all such cases, cataract is preceded by glaucoma, the eye is unnaturally hard, and the retina becomes totally insensible. When we know, then, that glaucoma has preceded cataract, or when we find the eye preternaturally firm, we cannot proceed with confidence to extract in the usual way. Perhaps, we ought to extract through a small section, as the only mode of operating which is safe and proper under such circumstances.

6. When the eyes are exceedingly restless, affected perhaps with involuntary, incontrollable, or convulsive motions, or when the patient is under the influence of excessive fear, or exhibits an extreme want of docility, the ordinary operation of extraction is out of the question. It has sometimes happened, under circumstances such as these, that even displacement has with great difficulty been effected. Thus in Mr Wardrop's first attempt to operate on James Mitchell, a blind and deaf boy, then about 15 years of age, the patient at first yielded readily, and allowed himself to be placed and held on the table. The uneasiness, however, occasioned by the pressure necessary to keep the eyeball steady, and the lids open, seemed to overcome his resolution, and his exertions became so violent that it was quite impossible to secure even his head. A second attempt was made the day following, more precautions being taken to secure him, but so violent were his exertions and cries, and so irascible did he become, that all present were glad to relinquish their posts. Some days after, a wooden box, the sides of which moved on hinges, was folded round his body, and fixed by circular ropes; and in this way, notwithstanding a powerful resistance, he was placed on a table and kept quite steady. Mr Wardrop had given up all hopes of extracting the cataract, and determined to try couching. Much difficulty was found in holding open the lids, and keeping the globe of the eye steady. As soon, however, as the needle touched the eye, he remained quite still, and his dreadful screaming ceased. With the sharp edge of the instrument, Mr Wardrop cut through the anterior portion of the capsule, and with its point dragged the lens from behind the pupil. On depressing the point of the needle, the lens remained out of view, except a small portion of its inferior edge. On the fourth day after the operation, the lens was found to have changed its place, and could be again distinguished covering about one-fourth of the upper edge of the pupil.[2]

III. With regard to the comparative merits of a *large* or *small section of the cornea*, it must be acknowledged, that while no operation

disturbs the internal textures of the eye less at the moment of performance than dexterously executed extraction through a semicircular incision, the dangers to which the safety of the eye is exposed, after the operation is finished, are of the most serious description. Extraction through a small section, on the other hand, causes more disturbance within the eye at the moment of operation, but is presumed to expose the organ to less risk after the cataract is removed. Extraction through a small section, although it requires fully as much caution, demands less dexterity than extraction through a semicircular section, endangers the iris less, is rarely followed by any considerable ejection of vitreous humour, or protrusion of the iris, and cannot produce so deforming or so mischievous a cicatrice, unless violent and disorganizing inflammation supervene. Fragments of the lens are apt to be left behind, and the lining membrane of the cornea is sometimes excited to inflammation, especially when the operation has been clumsily done, but there is no denying, that, after extraction through a small section, the operator sends his patient to bed with feelings of far less apprehension for the coming result, than after extraction through a semicircular incision.

IV. The principle on which the operations of *displacement* are founded is essentially bad. As well might we expect to lodge an entirely foreign body within the eye, and yet that no continued irritation should take place, no disorganization follow of the delicate textures with which it remained in contact, and the function of the organ not be interrupted, as that the lens could be pressed into the vitreous humour, and lie there close to the retina, and the eye continue healthy, and vision be preserved. Reclination and depression are to be thought of only when some insuperable objections exist to division and extraction. I assign them this low rank in the scale, not because the lens is apt to re-ascend after being displaced, for that I consider as rather a favourable event, from the chance it gives of the cataract being dissolved after its re-ascension, but because chronic inflammation within the eye, dissolution of the hyaloid membrane, and amaurosis, are, I believe, the almost invariable results of a cataract of any considerable bulk continuing undissolved in the unnatural situation assigned to it by depression or reclination.

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1 'Dominus *Packer* passus est in oculo sinistro cataractam confirmatissimam ad minus per annos 23, quam albissimam, satis compactam et maturam acu deturbandam sæpiùs suasi; unâ nocte, sine ulla causa externa, evanuit suffusio, et, licet confusè, mane cœpit et lucem aspicere et colores agnoscere. Venit ad me, et oculum ostendit purum, lucidum sine ulla humorum perturbatione, obscuritate aut confusione. Pupilla minor tantùm fuit, quæ tamen clauso altero oculo dilatabatur. Non credo fuisse dissipatum istud coagulum, sed pondere forsan ab uvea divulsam fundum petiisse aquei humoris eo loci ubi ab acu separata cataracta deprimitur et subsidit. Forsan ascendet denuò, ut sæpe contingit in cataractis malè depressis et locatis ab operatore, nisi forsan substantia crassior et gravis elevationem impediat.

'Elapsis diebus 15, ad me rediit, ostendit oculum clariorem, et facilè de omnibus objectis visibilibus potuit pronunciare. Dixit tamen uxorem aliquoties vidisse

'partem cataractæ denuo ascendentem ad pupillam, quæ validâ narium emunc-
'tione illico ima iterum petiit. Proculdubio recurret, neque enim absumi potest.'
Praxeos Mayernianæ Syntagma, p. 83 ; Londini, 1690.

See a case by Boyer, in his Traité des Maladies Chirurgicales ; Tome v. p. 509 ; Paris, 1816.

[2] Wardrop's History of James Mitchell, pp. 27, 32 ; London, 1813. From the expressions employed by Mr Wardrop, one is led to suppose that the cataract had been pressed upwards, not downwards, in the operation.

SECTION XIII.—SECONDARY CATARACT.

Secondary cataract consists either in some portion of the cataract which had existed previously to the operation, but which had been but imperfectly removed by it, or in some new production which first began to exist after the operation. Secondary cataract may be true, or spurious, or mixed. It may be a piece of lens, a piece of capsule, a lymphatic effusion, or a combination of these.

1. With regard to *lenticular* fragments remaining behind the pupil after any of the operations for cataract, if productive of no apparent irritation, it is the best practice to keep the pupil dilated, and wait for some time, so as to give them a chance of being dissolved by the aqueous humour. I am led to think, that occasionally a thin layer of lenticular substance is left adherent to the inside of the capsule after extraction, and that this layer, so thin and transparent as not to be observed at the moment of operation, soon becomes quite opaque, and forms an obstacle to vision after the wound is healed. It gradually dissolves, and the pupil clears.

Sometimes even an entire lens, which has re-ascended, may be allowed to remain, and will gradually be removed by absorption. In the meantime, external causes of irritation are to be carefully guarded against, and the pupil kept dilated by belladonna. Should solution not take place within a reasonable space of time, we have our choice either to extract the lens through a small section, or again displace it.

2. Secondary *capsular* cataract rarely follows the operations of displacement, especially reclination, although the capsule is seldom removed from the axis of vision along with the lens ; but after extraction, and still more after division, this sort of secondary cataract is very common.

If the anterior hemisphere of the capsule has been somewhat opaque before extraction was performed, and the operator has not carefully removed this opaque membrane when he extracted the lens, or if with a transparent capsule the second period of the operation has been carelessly performed, and any considerable degree of internal inflammation supervenes, secondary capsular cataract will certainly occur, and may be so complete and dense, as in a great measure to defeat the object of the operation. A slight

opacity of the torn capsule is a very frequent event after extraction. Indeed it rarely happens after the patient has recovered, that on concentrating the light by means of a lens, and allowing it to fall on the pupil, some opaque shreds are not visible. But even when these occupy the whole field of the pupil, I have seen the opacity so slight, that the patient could see to read and write through it, with the aid of a cataract-glass. If iritis occurs after the operation, the remnants of the capsule not only become white, and unite together, but they adhere to the iris, the pupil becomes small and angular, and although immediately after the exit of the lens, the patient distinguished objects with tolerable precision, probably a mere perception of light and shade will now be retained.

It is difficult to prevent the formation of secondary capsular cataract after the operation of division. If the anterior half of the capsule be merely rent across by the needle, or stript in one piece from the front of the lens, it is very apt to heal up again and to become opaque, so that it both prevents the process of solution from going on, and forms of itself a new obstacle to vision. If, in performing division, the lens and capsule be separated from their natural connexions, and buried deep in the vitreous humour, the lens may dissolve, provided the capsule is sufficiently lacerated, but the capsule itself will probably be seen, deep in the eye, floating about, and interrupting distinct vision.

The capsule in the transparent state is easily divided into shreds, but it is otherwise after it has become opaque and thickened by inflammation. It is then so tough and elastic, that it is almost impossible to divide it; we may carry it on the point of the needle almost to the bottom of the vitreous humour, whence it instantly springs up again to its former situation. To form a sufficient central aperture in such a capsule is next to impossible. It may sometimes be gathered round the curved needle, separated from its connexions, and depressed; but it seldom remains long in its new situation. In the natural state, and even after it has become opaque, the capsule is of less specific gravity than the aqueous humour or the vitreous fluid, and hence it tends always to float up into the pupil, a fact which should be borne in mind, as well in the ordinary operation of division, as in attempts to depress a secondary capsular cataract. A piece of much thickened capsule, if completely insulated, will sink, but if still connected with a considerable portion which is not thickened, the whole will float. Hence the propriety of dividing the capsule rather from below than from above, in order that if any shreds remain in connexion with the circumference of the capsule, they may be attached near its upper rather than its lower edge, and thus float out of the axis of vision.

The most satisfactory mode of removing secondary capsular cataract is through a small section of the cornea, as already described at page 699. In this way, I succeeded on one occasion in removing the whole capsule, forming an entire bag, the centre of the anterior hemisphere being thickened and almost cartilaginous, while the rest

of the capsule was transparent. The lens had been removed some years before by absorption.[1]

3. As for *spurious* secondary cataract, that which arises from the effusion of coagulable lymph, in consequence of iritis, is the most frequent. It may be very slight, fringing merely one edge of the pupil, impeding its motions on that side, giving rise to a sensation similar to what is styled a *musca volitans*, but not otherwise affecting vision. It may, on the other hand, appear very considerable, forming a net-work occupying the whole pupil, as is represented, after extraction, in *Figure* 83; or the pupil may be much contracted, perhaps almost closed, and adherent to the remains of the capsule. In the last mentioned case, the only method of restoring vision is to form an artificial pupil, in one or other of the ways hereafter to be described.

Fig. 83.

[1] See Gibson's Practical Observations on the Formation of an Artificial Pupil, &c. p. 117; London, 1811.

SECTION XIV.—CATARACT GLASSES.

The crystalline lens diminishes a little the image on the retina, but so little, that its loss does not make objects seem larger than they did to the eye before it became diseased. The cataract patient, after a successful operation, and before using glasses, does not complain of seeing objects larger than he did, before becoming affected with cataract. The loss of the crystalline, then, produces a very small diminution in the refractive power of the eye, but it affects much more the faculty which this organ possesses, in the natural state of accommodating itself to the different distances of objects. We endeavour to compensate for the diminished refractive power, and power of accommodation to different distances, by the use of double-convex or plano-convex glasses of different foci. The nearer the object to be viewed, the more convex the lens to be used, or in other words, the shorter its focus. The lenses generally employed are of the focus of $2\frac{1}{2}$ inches for reading or observing minute objects near at hand, and of $4\frac{1}{2}$ inches for viewing distant objects. I have known individuals of 50 years of age, read with 3 inch, and see distant objects very distinctly, with 5 inch glasses. Of course, glasses of the longest focus, which answer the purpose, are to be preferred; shorter ones may be necessary as life advances.

The glasses are employed for the purpose of rendering the vision of those who have been operated on for cataract, *perfect* as well as *distinct;* for there is a distinction, perhaps not a very accurately expressed one, admitted by opticians, between *distinct* and *per-*

fect vision. Cataract patients after operation often possess the former, but never the latter. From want of the crystalline, the rays of the luminous pencils, which diverge from visible objects, are no longer collected to absolute points of the retina, as in the perfect eye, yet these rays occupy portions of the retina so small, as to allow such persons to discern objects placed at a certain distance with tolerable clearness. Even at other distances than that at which they see best, they still discern objects, being enabled to do this chiefly from the changes which take place in the size of the pupil, according as the object viewed is more or less distant, but they are totally deprived of the control over the refractive powers which the eye possesses in the natural state, which enables the sound eye to see perfectly at all distances, and which depends either on a change of place in the lens, a change of figure, or both. From inattention to the above distinction, several authors have fallen into the error, of supposing that the eye retained the power of changing its focal distance, after being deprived of the crystalline lens.

Not only do patients who have been operated on for cataract see, with various degrees of distinctness, and at different distances, without the aid of any glass, or with one glass only for all distances, the changes in the size of the pupil assisting them much in doing so, but their sight is capable, by exercise, of very considerable improvement.

Haller mentions[1] the case of a nobleman who appears immediately after the cataract was removed from the axis of vision, to have seen distinctly at various distances. Miss H. a young lady of about 20, whose vision Dr Young examined, used for distant objects, a glass of $4\frac{1}{2}$ inches' focus, and with this she could read as far off as 12 inches, and as near as 5. Hanson, a carpenter, aged 63, who had had a cataract extracted a few years before, also examined by Dr Young, saw well to work with a lense of $2\frac{3}{8}$ inches' focus, and could read at 8 and at 15 inches, but most conveniently at 11. Mrs Maberly, aged about 30, who had had both lenses extracted, walked without glasses, and, with the assistance of a lens of about 4 inches' focus, could read and work with ease.[2] M. Gabriel, cured of cataract by division under the care of Maunoir, read a book printed in a very small type, with the aid of the same glass, with which he viewed the pictures hung round a room, engaged in the chase, and won a prize at shooting, the distance being 200 paces.[3] A boy of 12 years of age, operated on by Dr Rainy, at the Glasgow Eye Infirmary, saw distant objects distinctly, and read easily with glasses of $4\frac{1}{2}$ inches' focus. Mr W. J. aged 60, upon whom I operated by extraction, wrote without glasses and read what he had written, but required glasses of $2\frac{1}{2}$ inches' focus to read a printed book.

The following is a good example of the capability for improvement which the eye possesses after removal of the crystalline lens. Sir William Adams operated on a postilion, who had been blind nine years in one eye, and three in the other. Both cataracts were removed by division, and when the patient resumed his employment as a postilion, he was from necessity obliged to wear spectacles, not

being able even to walk without them; but finding that his passengers were frequently apprehensive of their safety, from being driven by a person requiring spectacles, he by degrees left them off altogether in the day; and in the course of twelve months could drive quite as well without as with them.[4]

In all these, and similar instances of distinct and improving vision after the removal of the crystalline lens, the use of the *optometer*[5] would at once demonstrate that perfect vision was wanting, or in other words that the eye had lost all control over its refractive powers.

The two hasty employment of cataract-glasses after the most successful operation, may soon bring the eye to a state of weakness, which will render it unfit even for those employments which require but a moderate degree of sight. No cataract glasses ought to be given to a patient so long as his vision appears to be improving without their use. This generally continues to be the case for several months after the operation. If we allow our patient to use cataract-glasses during this period, he will no doubt be very glad to find that he can return immediately to almost all his ordinary pursuits; but he will soon begin to observe that he does not see so well as he did, and this he will probably remedy by a new pair of glasses of greater convexity, and consequently of greater magnifying power, than those which he first employed. He will go on in this way, changing his glasses as his power of vision becomes less, till at last he ends in finding none which enable him to see so well as he did with those which he first employed. On the other hand, if our patient does not begin to try cataract-glasses till he has completely recovered from the operation, and the eye has as much as possible habituated itself to the absence of the crystalline lens, if he then select proper glasses, and use them for a while only occasionally, his sight will still continue to improve, and his first glasses will probably, if he be an old man, serve him all his life, and if he be a man of 30 or 40, he will not require to change them till he be 50 or 60. He will be able to return to the finest kind of work in which he had been employed, such as drawing, or, if the person be a female, to sewing, and the like.

The best test of a cataract-glass is, that, when placed immediately in front of the eye, it enables the person perfectly to see objects, at that distance at which he could see them before he became affected with cataract. If he chooses glasses of too long a focus, for example, of five inches' focus instead of four, and three instead of two and a half, he will by and by discover that he sees ill with such glasses, unless he move them two or three inches forward from his eyes, when he finds that they enable him to see distinctly. In this case, he must be furnished with glasses of shorter focus than those he had at first selected, so that the images of objects may be formed exactly on the retina. Cataract-glasses ought not to bring the object too near, else the patient will be apt to mistake the distance at which it is placed from him, and on trying to grasp it, his hand will fall

short of it. When this is the case, glasses of longer focus should be selected.

It is said, that those who have been short-sighted previously to the formation of cataract, can, after a successful operation, lay aside their concave glasses, without having occasion for any convex ones; and that some require even concave glasses after the operation for cataract, but less concave of course than those which they formerly used. But such statements are probably incorrect. Having operated by extraction on a man all his life short-sighted, I found that for the vision of distant objects he required the usual glasses of four and a half inches' focus.

If a patient from whose eye a cataract has been successfully removed, had been originally a little short-sighted, but never used a concave glass, on supplying him with a convex glass after the operation, he will sometimes mention that he sees objects much more beautifully than they ever appeared to him before. In fact, he had never seen objects with the distinctness and brilliancy with which they appear to an ordinary eye, or to a myopic eye armed with a concave glass.

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[1] 'Et lente ob cataractam extracta vel deposita oculum tamen ad varias distantias videre, ut coram in nobili viro video absque ullo experimento, quo eam facultatem recuperaverit. Et si enim tunc ob diminutas vires, quæ radios uniunt, æger lente vitrea opus habet, eadem tamen lens in omni distantia sufficit.' Elementa Physiologiæ, Tom. v; Lib. xvi. Sect. iv. § 25. p. 514; Lausannæ, 1763.

[2] On the Mechanism of the Eye, by Thomas Young, M.D; Philosophical Transactions for 1801, p. 65.

[3] Annales des Sciences Naturelles, Seconde série, Tome v. p. 190; Paris, 1836.

[4] Journal of Science and the Arts, Vol. ii. p. 409; London, 1817.

[5] Porterfield's Treatise on the Eye, Vol. i. p. 434; Edinburgh, 1759. Philosophical Transactions for 1801, pp. 34, 64.

CHAPTER XIX.

ARTIFICIAL PUPIL.

SECTION I.—INTRODUCTORY VIEW OF THE METHODS OF FORMING AN ARTIFICIAL PUPIL.

1. The first attempt to restore vision, in cases in which the natural pupil had closed, or at least the first that was attended with success, was made by Cheselden, some time previous to 1728. (See page 563.) In that year, he published a short account of two cases, in which the natural pupil having closed after the operation of couching,

he formed an artificial pupil. He did this by introducing a small one-edged knife or needle, through the temporal side of the sclerotica, and through the iris into the anterior chamber; he then turned the cutting edge of the instrument towards the iris, and as he withdrew the knife, divided the iris transversely, so as to leave an incision in that membrane, or an artificial pupil, extending to two-thirds of its diameter. (*Fig.* 84.) In his first case, he formed the artificial pupil above the centre of the iris or place of the natural pupil, because he did not know how low he might have lodged the cataract in the operation of couching, which had led to the closure of the natural pupil. In his second case, for what reason he does not mention, he formed the artificial pupil below the middle of the iris. His account of the whole is so brief, that we are left in doubt how far the first patient recovered sight. The second, he states, thought every object at first farther from him than it was in reality, but soon learned to judge the true distance.[1]

Fig. 84.

Such was the original method of forming an artificial pupil. As other methods have since been invented, we may distinguish this as an *artificial pupil by incision.*

II. In the hands of the first Wenzel, Cheselden's operation failed, and this led him to invent another method of opening up an artificial passage for the rays of light through the iris, in cases similar to those in which Cheselden had operated, namely, closed pupil after an operation for cataract. He first pierced the cornea with the point of the extraction-knife, as in the operation of extraction. When the point of the instrument had arrived near the centre of the iris, he plunged it through that membrane; then carrying the handle of the instrument backward, he brought out its point through the iris on the nasal side of the contracted pupil, and through the cornea as in the operation of extraction. Carrying the knife onwards, he divided at once both the iris and the cornea, only that he necessarily completed the semicircular section of the former before that of the latter. (*Fig.* 85.) He then introduced a small pair of scissors through the incision of the cornea, and cut off the flap of the iris.[2] This, then, is what we term an *artificial pupil by excision.*

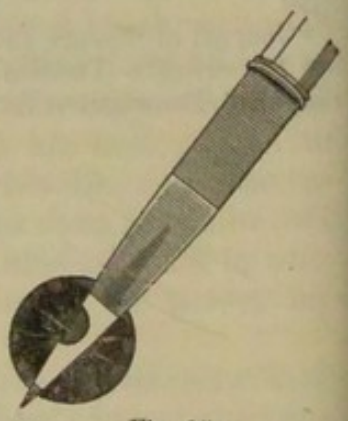

Fig. 85.

III. The facts that sometimes even a slight blow on the eye will separate a portion of the circumference of the iris from the choroid, (*Fig.* 40, page 338,) that in operations with the needle similar separations are apt to happen, and that the *false pupils*, as they may be called, which are thus formed, often continue permanently open, have suggested to different operators the idea of a third method of forming an artificial pupil. Scarpa, for instance, having passed a needle through the temporal side of the sclerotica, advanced its

point as far as the upper part of the nasal margin of the iris, which he pierced so that the point of the needle became just perceptible in the anterior chamber, close to the edge of the cornea. He then with the needle pressed upon the iris from above downwards and from within outwards, so that a portion of its edge might be separated from the choroid. Placing the point of the needle upon the inferior angle of the commenced fissure, at the same time drawing the iris towards the temple, he continued the pressure till the separation (*Fig.* 86.) was of sufficient extent. Scarpa first employed a straight needle, but afterwards recommended one which was bent, as better calculated for the formation of this *artificial pupil by separation*.[3]

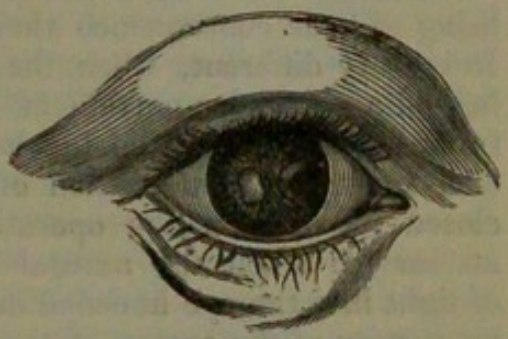

Fig. 86.

There are three kinds of operation, then, for the formation of an artificial pupil, viz. *incision*, *excision*, and *separation ;* and all three were invented for the purpose of restoring vision, in cases in which the natural pupil had closed after an operation for cataract. There are other cases, however, in which the formation of an artificial pupil becomes necessary; and as an example of these, I may mention opacity of the centre of the cornea. Suppose that the central portion of the cornea, to the extent of one-fifth of an inch in diameter, is occupied by a dense leucoma, even although the natural pupil is open and moveable, and the iris perfectly healthy, the patient will be deprived of any useful degree of sight. If he turns his back to the light, indeed, he may perhaps see a little past the edge of the speck, he may also discern objects obscurely in the twilight, when the pupil dilates, in consequence of the moderate light to which the eye is exposed; but in bright light he sees nothing. We sometimes find that artificial dilatation of the pupil by belladonna suffices in such a case to restore a considerable share of useful vision. I have known patients affected with partial opacity of the cornea, continue for many years the daily application of a filtered solution of belladonna to the conjunctiva, for the purpose of dilating the pupil, so that the light might enter the eye between the edge of the speck and the pupillary edge of the iris. In many cases, however, of partial opacity of the cornea, the speck is so broad, that dilatation of the pupil to the utmost extent attainable by belladonna, cannot restore any useful degree of vision. In these cases, then, and also when the frequent application of the belladonna proves irksome or inconvenient to the patient, we are naturally led to the expedient of removing a portion of the iris from behind the lucid part of the cornea, or in other words, of forming an artificial pupil. It would evidently be impossible, however, to do this by incision, excision, or separation, according to the modes already described as having been adopted by Cheselden, Wenzel, and Scarpa, without injuring the crystalline

lens, and thereby producing cataract. This, of course, must be avoided, and hence have arisen certain necessary changes in the methods of forming an artificial pupil, according to the condition of the cornea and crystalline lens. In the cases operated on by Cheselden, Wenzel, and Scarpa, the whole cornea being transparent, and the lens no longer occupying its natural place, an aperture for the transmission of light was the whole object of their solicitude, it being of little consequence where or how the new pupil was obtained. It is very different, when the artificial aperture must be placed behind a particular portion of the cornea, and when the lens being transparent must not be touched during the operation. Wenzel's excision of a *central* portion of the iris, was adapted for cases of closed pupil, after the operation of extraction; but could be of no service when the natural pupil was open, and the entrance of light into the eye impeded merely by opacity of the centre of the cornea. For this sort of case, the excision of a *lateral* portion of the iris is the appropriate operation, (*Fig.* 87.) and is generally effected simply by making a small opening through the cornea close to its edge, and snipping off the portion of iris, which either protrudes with the gush of aqueous humour, or is easily dragged out with a small hook or pair of forceps.

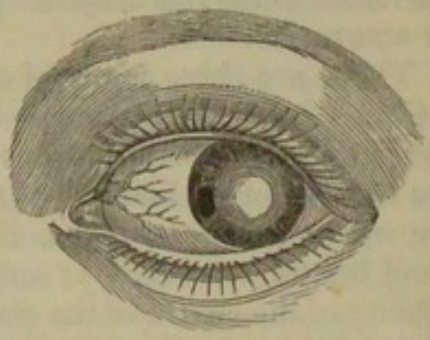

Fig. 87.

The operations for artificial pupil, although founded on the three simple plans of cutting through the iris, cutting out a piece of it, and separating part of its circumference from the choroid, have, like the operations for cataract, undergone an endless variety of modifications, suggested partly by the diversity of the diseased states of the eye requiring an artificial pupil, and partly originating in the peculiar notions of different operators.

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[1] Philosophical Transactions for 1728; Vol. xxxv. p. 451. The mistakes into which Haller, Wenzel, Janin, Guthrie, and others, have fallen, regarding Cheselden's cases, must have arisen entirely from their neglecting to read with attention the account which he has given of them. The last mentioned author, who published on Artificial Pupil in 1819, gravely tells us, that Cheselden "does not seem to have performed the operation on the person whose history he relates."

[2] Traité de la Cataracte, par M. De Wenzel, fils. pp. 190, 198; Paris, 1786.

[3] Saggio di Osservazioni e d'Esperienze sulle principali Malattie degli Occhi; Pavia, 1801.

SECTION II.—DISEASED STATES OF THE EYE REQUIRING THE FORMATION OF AN ARTIFICIAL PUPIL.

The diseased states of the eye, requiring that an artificial pupil should be formed for the restoration of vision, are almost entirely

the effects either of some of the ophthalmiæ, or of inflammation consequent to some injury or operation. According to the parts affected in different cases, they may be grouped under the seven following heads.

I. *Partial opacity of the cornea.* This includes those cases in which there is such a degree of opacity of the central portion of the cornea as to cover the pupil, while the whole, or at least a part of the circumferential portion remains transparent. The pupil itself is open; the iris unadherent; every part, in fact, is supposed to be healthy but the cornea. Through the transparent portion of the cornea, the light enters, but is arrested by the iris; let a part of this opaque membrane be removed, the light passing through the new pupil thus formed, will be transmitted to the retina, and vision restored. Should the opaque portion of the cornea be so limited in extent, that dilating the natural pupil by belladonna suffices to restore a considerable share of useful vision, it would be wrong to hazard an operation; but should the opacity be so extensive that dilatation by belladonna adds little or nothing to the patient's perception of objects, we remove a part of the iris from behind the lucid portion of the cornea, by the operation either of lateral excision or of separation. When there is a considerable field of transparent cornea, its circumference is to be opened, in a certain extent, close to the sclerotica, the iris is to be allowed to protrude, or, if it does not do so, a portion of it is to be drawn out, and as much snipped off with the scissors as shall form a sufficient aperture in the iris, to serve as an artificial pupil. On the other hand, if the lucid portion of the cornea is small in extent, (less perhaps than a line's breadth,) it would be unsafe to cut into that portion, in order to extract a part of the iris for excision; for should the wound inflame, the whole of the transparent segment of the cornea might thus be rendered opaque, and all chance of restoring sight destroyed. In such a case, the operation of separation must be had recourse to, not, however, in the manner practised by Scarpa, and shortly described in the preceding section, but by means of a hook introduced through an incision of the cornea, the incision being made at a distance from the lucid segment.

II. *Partial opacity of the cornea, with partial adhesion of the iris to the cornea.* The cases falling under this head are generally the results of penetrating wound or of ulcer of the cornea. Like the cases of uncombined opacity of the cornea, those belonging to this class vary remarkably in regard to the extent of the opacity. The central portion only may be opaque, or the opacity may leave but a small segment of lucid cornea close to the sclerotica. The iris also is involved in these cases, in very different degrees. The pupillary edge of the iris, in a single point merely, may be adherent to the cornea, without almost any distortion of the pupil. In other cases, although the edge of the pupil has not been directly involved in the ulcer which has ended in the opacity of the cornea, the pupil is distorted, contracted, and, though partially open, is so hid behind the

leucoma, that vision is completely impeded. In a third set of cases, the whole pupillary edge of the iris has been involved in the ulcer, and is therefore adherent to the cicatrice, while the anterior chamber is almost obliterated by the advancement of the iris towards the cornea. In a fourth set, the united cicatrice and iris may have protruded, so as to form a partial staphyloma.

The same rule will guide us in the choice of an operation for artificial pupil in cases of this class, as in those of the former; namely, that when there remains only a small segment of the cornea transparent, this is too valuable to be tampered with, no incision is to be risked into that transparent segment, lest it should thereby be rendered permanently opaque, but an incision must be made at a distance, and the iris withdrawn from behind the transparent part by separation from the choroid. When, on the other hand, there is a considerable portion of the cornea transparent, lateral excision will, in general, be had recourse to; not, indeed, with the same facility as if there was no adhesion between the iris and cornea, but still without any insurmountable difficulty. The iris will probably not be protruded by the mere pressure of the aqueous humour rushing through the incision of the cornea, but the hook or the forceps will in general serve easily to extract the portion of iris which is to be removed by the scissors.

III. *Closure of the pupil, the lens and capsule being supposed to be transparent.* Closure of the pupil from inflammation of the iris, without any opacity of the capsule, or any adhesion between it and the iris, is certainly a very rare occurrence, and from the appearances presented, is exceedingly liable to be taken for a case of closure of the pupil with adhesion to an opaque capsule. As it is a rule from which there is no exception, that, in forming an artificial pupil, if the lens and capsule are transparent before the operation, they must be left untouched, it would evidently be wrong, in any case in which there was reason to suppose that closure of the pupil was the whole amount of disease, to have recourse to the operation of incision, or to perform any operation except in the most cautious manner. Lateral excision is indicated in such a case. After laying hold of a portion of the iris and extracting it for excision, a clot of unorganized lymph may be found to occupy the posterior chamber, without adhering to the capsule; and is to be removed. Perhaps we discover, on removing a portion of the iris, that our great caution has been unnecessary, as the capsule is opaque; or on attempting to extract a portion of the iris for excision, we find so firm an adhesion between that membrane and the capsule, that it is impossible to effect our object, so that some other mode of procedure must be adopted. No evil, however, can arise from our having entertained a more favourable view of the case than we find to be warranted by the state of the parts, when we come to operate. Through the artificial pupil formed by lateral excision, we may immediately introduce the needle and divide the cataract, extracting the lens in fragments, and perhaps the capsule also; or we may de-

lay till the eye has recovered from what has been done, and afterwards proceed to remove the cataract from behind the new pupil.

IV. *Closure of the pupil, with adhesion of the iris to the crystalline capsule.* In this case, something requires to be done for the removal of the lens, either at the moment of forming the artificial pupil, or subsequently. For the formation of the artificial pupil, incision is sometimes chosen, and performed through an opening of the cornea sufficiently extensive to allow the lens to be extracted. Cheselden's method has also been practised in such cases, the lens being divided by the iris-knife, and its fragments thrust forwards through the new pupil into the anterior chamber for solution. Some have preferred, in such circumstances, forming first an artificial pupil by lateral excision, and afterwards have divided the lens. Others have chosen central excision, and immediately proceeded to extract the cataract through the artificial pupil.

V. *Closure of the pupil after an operation for cataract.* As it was in cases of this kind, that Cheselden, with such signal success, had recourse to a simple incision of the iris for the purpose of forming an artificial pupil, it may appear strange that Wenzel, when he tried the same operation, was so disappointed, that he laid it aside, and adopted that of central excision. The cases, however, in which Cheselden succeeded, and those in which Wenzel failed, in forming a permanent artificial pupil by incision, differed, we have no doubt, in a most material circumstance, namely, the healthy or unhealthy state of the iris; for, as I shall have occasion in a following section to explain more particularly, an incision through an iris, the texture of which has suffered but little from inflammation, is likely to remain permanently open, while one through the same membrane after it has become thickened and otherwise changed in texture, almost invariably closes, and its edges reunite. Hence, it is necessary to lay it down as a rule regarding the cases falling under this head, that if the appearance of the iris and the history of the case lead to the conclusion, that the closure of the pupil has taken place without any severe or long-continued inflammation of the iris, simple incision may be practised, either according to Cheselden's method, or some other, more recently devised; but that if the iris appears to be much altered in texture, or if the history of the case declares that severe and long-continued iritis has attended the closure of the pupil, excision or separation ought to be adopted.

VI. *Closure of the pupil from protrusion of the iris after extraction.* This is a very peculiar case, inasmuch as the fibres of that part of the iris which is unconnected with the cornea are completely on the stretch, so that they are easily divided, and the artificial pupil formed by incision instantly expands. From these circumstances, this case is by far the best suited for the operation of incision. In some of the other cases, there appears room for deliberation between the different kinds of operation, but in this there is none.

VII. *Partial opacity of the cornea, closure of the pupil, adhesion of the iris to the cornea or to the capsule, and opacity of the capsule.* So

complicated a case as this might appear, on first enunciation, as altogether beyond relief. Yet some of the very best recoveries of sight, by means of an artificial pupil, have taken place under circumstances of this unfavourable nature. There is, we shall say, a lucid segment of cornea, from behind which, by means of lateral excision or separation, we remove a portion of the iris; this reveals an opaque lens and capsule, which after some time we remove by the needle, and thus restore vision.

SECTION III.—GENERAL RULES REGARDING ARTIFICIAL PUPIL.

1. As in every instance, those states of the eye which require the formation of an artificial pupil, originate partly, if not entirely, in inflammation, the renewal of which might prove fatal to the success of the operation, it is to be received as a general rule, that no artificial pupil be formed, unless the patient's general health is good, and the eye has for a considerable space of time been perfectly free from every symptom of inflammation, except those irremovable ones, to counteract the effects of which the operation is undertaken.

2. An artificial pupil ought never to be formed in the one eye, so long as the individual is able to see with the other; for to see well with the sound eye, he would require to shut that in which the artificial pupil had been formed, and contrariwise; the axes of vision in the two eyes seldom, if ever, in such circumstances, being correspondent.

3. We ought not to attempt the formation of an artificial pupil, in an eye with which the patient discerns common objects with tolerable distinctness, such as, a pen, knife, scissors, &c. lest by the operation we deprive him of the degree of vision he enjoys.

4. It is of no use to form an artificial pupil, unless the portion of cornea behind which it will be placed, is tolerably pellucid. If it be nebulous, little or no accession of vision will be gained. Cases of central leucoma, with adherent iris, the circumferential portion of the cornea being nebulous, and in contact with the iris, occur not unfrequently. It is needless to attempt the formation of an artificial pupil under such circumstances.

5. An operation for artificial pupil ought not to be undertaken, if there be present granular conjunctiva, vasculo-nebulous cornea, varicose dilatation of the blood-vessels, attenuation of the sclerotica, bogginess of the eyeball, preternatural hardness, dropsy, atrophy, strabismus, or the like.

6. Neither would we operate where the retina was not tolerably sound. Should the diseased state of the eye be a speck of the cornea, and should the patient, on dilating the pupil with belladonna, see no better than before, it is probable the vitreous humour and retina are unsound, so that on attempting to form an artificial pupil, the vitreous humour would burst and be evacuated, or after even

the most successful formation of a pupil, the amaurotic state of the retina would prevent any improvement in vision. If the pupil is obliterated, and the dull discoloured iris bulges much towards the cornea, and especially if this state is the result of syphilitic inflammation, the retina is probably unsound.

7. Though it must be a mere experiment, yet it may sometimes occur that the formation of an artificial pupil will restore the power of vision to an eye which was previously unable to distinguish even between light and shade. Generally, indeed, it is regarded as an indispensable condition for the performance of this operation, that the eye be able to discriminate between different gradations of light; yet it is possible, from the natural pupil being completely obliterated, the iris at the same time thickened, and lymph accumulated in the posterior chamber, added perhaps to opacity of the lens and capsule, that the patient shall be unable to distinguish light from darkness, although the more internal parts of the eye are still susceptible of resuming their office, were the impediments now enumerated removed by operation. Pönitz, the German translator of Assalini on Artificial Pupil, mentions two cases, in which he operated with success, although the patients were previously unable to distinguish even the brightest light.

8. The formation of an artificial pupil ought rarely, if ever, to be attempted in a scrofulous subject under the age of puberty, more especially if the diseased state of the eye, rendering this operation necessary, has originated in scrofulous ophthalmia, independent of injury. After an operation in such a subject, inflammation of the scrofulous character is almost sure to follow, and will probably destroy the eye. In the course of a few years after puberty, the operation may be performed with less danger.

9. The formation of an artificial pupil, on account of morbid changes in the cornea or iris, resulting from specific diseases, as scrofula or syphilis, is generally unsuccessful. The case is more hopeful, if the diseased state of the eye is the result of one of the puro-mucous ophthalmiæ; and still more so, if it be directly of traumatic origin.

10. If the artificial pupil cannot be formed in or near the centre of the iris, and if the operator has a choice of placing it behind either the nasal or the temporal edge of the cornea, he ought to prefer the former of these two situations, both as affording a more useful degree of vision, and as causing less deformity. Often, however, the operator has no choice, but must form the artificial pupil behind the only portion of cornea which remains lucid, whether that be at the temporal or nasal edge, at the upper or the lower. It is easier, in general, to form an artificial pupil at the temporal edge than at the nasal; and it is urged by Mr Gibson, that the patient enjoys a greater field of vision when the pupil is towards the temple. This, however, may be doubted; and, at any rate, there is a much greater degree of awkwardness in the appearance and employment of an eye in which the pupil is behind the temporal

edge of the cornea, the patient evidently finding it difficult to turn the eye so as to bring the pupil into the necessary direction, and embrace with it the usual range of objects.

11. If an artificial pupil is to be formed in each eye, some direct us to make the one behind the temporal side of the one cornea, and the other behind the nasal side of the other cornea, alleging that in this way there is a greater degree of correspondence between them, than if they were formed in any other situations except in the centre of the eyes. If both pupils are towards the temple, as in Maunoir's patient, the Marquis de Beaumanoir,[1] the appearance is far from being natural or agreeable.

12. In all cases in which the lens and capsule are transparent, the artificial pupil must be formed in such a way as to leave these parts untouched.

13. As an artificial pupil generally possesses no power of contracting or dilating, care must be taken that it is made neither too large nor too small. It is remarkable, indeed, how useful a very small artificial pupil may prove, as is well illustrated in the celebrated instance (*Fig.* 88.) of M. Sauvages, operated on by Demours.[2] In general, however, so small a pupil does not prove very serviceable; while, on the other hand, an artificial pupil much above the medium size of the natural one, exposes the eye to be constantly dazzled, and is thus rendered comparatively useless.

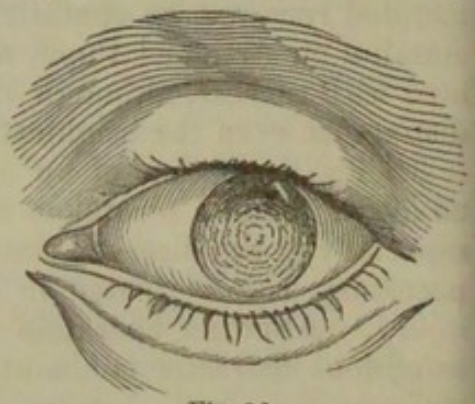

Fig. 88.

[1] Medico-Chirurgical Transactions; Vol. vii. pp. 305, 309; London, 1816.

[2] Traité des Maladies des Yeux; Tome iii. p. 426; Planche 46. Fig. 1; Paris, 1818.

SECTION IV.—INCISION, EXCISION, AND SEPARATION COMPARED. CONDITIONS NECESSARY FOR THESE OPERATIONS.

I. The simplest mode of forming an artificial pupil consists in one or more incisions through the substance of the iris, made in expectation that the opening so formed will gape, and continue permanent. If the opening through the iris is formed by one incision, it may run horizontally, so as to produce a pupil resembling that of the ruminating animals, or perpendicularly, so as to form one resembling the pupil of the cat-tribe. The artificial pupil may be oblique in its direction, and may occupy the superior, inferior, nasal, or temporal portion of the iris; it may run not in a straight, but, as Janin preferred it, in a curved line; or it may be formed, as Maunoir has recommended, by two incisions meeting each other at an acute angle. The formation of an artificial pupil by incision may be accomplished

by passing the needle or knife through the cornea, and thus commencing upon the anterior surface of the iris, or the instrument may be entered through the sclerotica, and then pass through the iris into the anterior chamber. These particulars will be determined, partly by the views of the operator, and partly by the state of the eye upon which he is to operate.

It must be evident, that it is an indispensable condition for the success of incision, that the iris be in such a state as shall secure the dilatation of the new pupil, as soon as the operation is completed. If the artificial pupil do not dilate, the iris will very soon heal, and the patient will be just where he was. In order that the new pupil may dilate, it is necessary that the substance of the iris be in a tolerably healthy state. If that membrane has sustained violent, long-continued, or frequently-repeated inflammation, its fibres are rendered incapable of contracting, and consequently if such attacks have ended in closure of the natural pupil, the iris is unfit to be operated on by incision. Whenever, then, the history of the case and the appearances of the eye lead us to believe, that there has been severe iritis, we ought to choose some other method of operating. It is not, however, in every case of closure of the natural pupil from iritis, that the fibres of the iris are rendered incapable of contracting, but only when the inflammation of the iris has been severe and long-continued, ending in thickening of that membrane, with sanguineous or lymphatic deposition in its substance, or on its posterior surface.

It is interesting to inquire how those differences of opinion have arisen, which have existed in the minds of operators regarding incision, and how this operation has occasionally succeeded, and at other times completely failed. The explanation will be found in the difference of cases; in the fitness of some, and unfitness of others, for this operation. In proof of this, we may refer to the testimony of Janin. The first case in which he performed incision was one of obliteration of the pupil from inflammation after extraction; and the second, obliteration from severe ophthalmia. In both, he made a horizontal incision to the extent of two-thirds of the diameter of the iris, and in both, on opening the eye some days after the operation, he found the artificial pupil completely closed, and the incision healed.[1] I believe that we are warranted in asserting, that the closure of these two artificial pupils would not have taken place, had the substance of the iris been in a natural state; and the proof of this may be taken from Janin himself. In several instances, while performing extraction of the cataract, this operator happened accidentally to wound the iris. Reasoning from his experience in the two cases of artificial pupil, he expected that these accidental wounds would heal. Here, however, he was disappointed. These incisions had been made in healthy irides, and on opening the eyes some days afterwards, he found the incisions more dilated than at the moment of operation.[2] Had he been led from these striking facts, to compare his failures in the operation of incision with the success which

had attended this method of operating in the hands of Cheselden, he might have discovered the true cause of the diversity of results; namely, the different states in which the substance of the iris must have been at the moment of operating. Instead of this, Janin was led to attribute his want of success to something faulty in the form and direction of his incision. The true cause unfortunately escaped him, as it did many of his successors, who, omitting a careful examination of the whole facts, bestowed their attention chiefly on the most effectual mode of dividing the two sets of supposed muscular fibres of the iris. It was not in fact till the publication[3] of Sir William Adams' cases of artificial pupil by incision, that the objections thrown out against this operation by Scarpa and others, were in some measure removed; although even Sir William missed the true secret of his own success, attributing it not to the condition of the iris upon which he operated, but to the form of his knife, and the extent of his incision. We need not hesitate to assert, that in every case in which the substance of the iris is not greatly altered by inflammation, we may confidently expect a successful issue to the operation by incision, in whatever direction, or in whatever part of the iris the incision is made, above or below, or in the line of the natural pupil, and whether it is a mere pin-hole or extends to two-thirds of the diameter of the iris.

Besides a tolerably healthy state of the iris, there are other conditions necessary for incision. Among these we may mention a considerable field of transparent cornea, opposite to that portion of iris which is to be divided. We would never think of incision, if there were merely a narrow segment of cornea transparent, and all the rest opaque; for in such a case an artificial pupil by incision could be little more than a mere fissure, whereas a more considerable and more useful pupil might be formed by separating the iris from the choroid, and removing it completely from behind the lucid portion of the cornea.

Another condition necessary for incision, is that the iris possess a certain degree of tension, and be actually fixed in some measure, either by closure of the natural pupil, or by partial adhesion to the cornea. This condition exists in a very striking manner, in those cases of closure of the pupil and dragging of the iris, which occur from prolapsus of this membrane, after extraction of the cataract. Not merely is the iris easily divided in these cases, but the new pupil instantly gapes and rarely afterwards contracts, so that they are actually the best cases for the operation of incision. If, on the other hand, the pupil is perfectly free, the iris will glide from before the point of any instrument with which we might attempt to divide it, and even if the iris were transfixed, it would be difficult to give the incision the form and extent required. In all cases, then, in which partial opacity of the cornea merely is the occasion of our having recourse to the formation of an artificial pupil, incision, on account of the danger of wounding the crystalline capsule, as well as for the reason now stated, would be improper.

II. As excision is the cutting out and completely removing from the eye of a portion of the iris, this operation can be performed conveniently and safely only through the cornea. It will require also a considerable opening in the cornea, in order to allow either a spontaneous protrusion of the portion of iris to be removed, or the introduction of such instruments as are to drag that portion forth, or be employed within the eye in snipping it out. As to the situation, form, and dimensions of an artificial pupil by excision, these must depend partly on the fancy of the operator, but chiefly on the incontrollable circumstances in which the iris, cornea, and other parts implicated in the operation are placed. Above all, the situation and dimensions of the new pupil must depend on the extent and place of the transparent part of the cornea.

The cases in which the pupil is open and the iris free, and which we have already mentioned to be totally unfit for incision, are the very best for excision, for it is evident that it is only in such cases that the protrusion of the iris through the wound of the cornea will take place with that degree of facility, and to that extent, which will enable us to finish the operation simply by laying hold of the prolapsed portion of iris with the forceps, and snipping it off with the scissors. If, on the other hand, the natural pupil is completely closed, and the posterior surface of the iris glued to the parts behind it, excision in this easy way is impracticable, as a protrusion of the iris through the wound of the cornea will neither take place spontaneously, nor can it be readily effected by means of the hook or forceps introduced into the anterior chamber.

In those cases in which the iris is only in a small extent adherent to the cornea, excision may in general be performed with ease, a very limited adhesion seldom preventing a spontaneous protrusion of the iris through the wound of the cornea. But if the adhesion between the iris and the cornea is extensive, involving perhaps the whole circumference of the pupil, it would be difficult and perhaps impossible, to effect a protrusion, even with the aid of the hook or forceps.

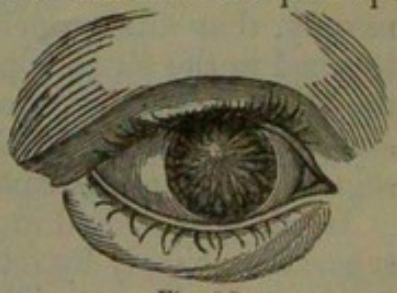

Fig. 89.

Vision may occasionally be restored in cases of very limited adhesion of the iris to the cornea, (*Fig.* 89.) simply by separating the adherent portion, or, if this cannot be accomplished, by cutting across the adherent part, thus freeing the iris, and allowing the natural pupil (in the latter instance a little enlarged) to resume its functions.[4] (*Fig.* 90.) A quarter-section being made at the edge of the cornea, a small probe is to be introduced, and an attempt made to separate the adhesion, which may sometimes succeed, if the adhesion has been consequent merely to inflammation, without any ulceration of the cornea or prolapsus of the

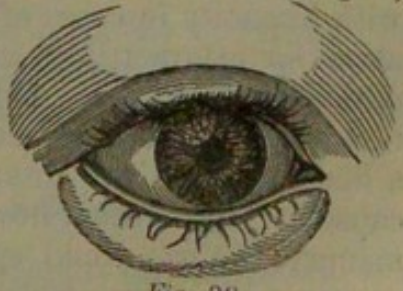

Fig. 90.

iris. If it does not succeed, we may either, with Beer, introduce Cheselden's iris-scalpel, and cut the adherent point of iris across, or, as Assalini recommends, use a very small pair of scissors for the same purpose.[5] Should this *abscission* of the iris, as it may be called, seem insufficient to restore the natural pupil to its office, the opaque part of the cornea still covering it too much to permit the necessary quantity of light to enter the eye, we may immediately enlarge the pupil by the excision of a portion of the iris. Cases of this sort are capable of being improved, however, simply by *prolapsing* a portion of the iris, and thus dragging the pupil from behind the opacity; a method of operating successfully employed by Himly.[6]

III. Separation is an operation which by some has been deemed applicable in almost every case requiring the formation of an artificial pupil, but which I am inclined to employ less frequently than either incision or excision. It is undeniable that there is no case in which separation might not be performed, let it be one of partial opacity of the cornea merely, of closure of the natural pupil, or of some of the complicated consequences of injury or of inflammation; but it is also true, that, on account of the laceration of blood-vessels and nerves with which it is attended, separation is more severe and painful, accompanied by greater danger to the eye, and followed by a more tedious recovery, than either of the other modes of operating. The artificial pupil formed by separation, unless very particular precautions are adopted, is also extremely apt to close, the portion of iris which has been separated returning to its former situation, and re-adhering to the choroid. For these reasons, we should always seek to attain our object by excision or incision, and only when these are unlikely to fulfil our intention, ought we to have recourse to separation.

There is one advantage which separation possesses over incision, and which may therefore serve in certain cases to recommend it; namely, that with proper care the lens and capsule may be left untouched in the former operation, which can very seldom be done in the latter. By separation also we are able to form the largest possible pupil admitted by the state of the parts, which, when the lucid segment of cornea is small, is an advantage of no mean importance.

It has been stated in a previous section, that Scarpa practised separation, simply by introducing a curved needle through the sclerotica, and with its point dragging away, on the nasal side, the ciliary edge of the iris from the choroid. This might no doubt be done with impunity in cases of closure of the natural pupil after an operation for cataract, but would be quite inapplicable if the lens and capsule were sound. Hence another method of performing separation has been adopted, namely, opening the cornea, and introducing a hook through the anterior chamber, avoiding thus the lens and capsule. Separated, however, even by the hook introduced in this manner, the iris would speedily return to its former place, and the new pupil be thus obliterated, were not some means adopted for

preventing this. To Langenbeck, we owe the additional step of bringing out through the wound of the cornea a portion of the separated iris, allowing it to remain strangulated between the lips of the wound till adhesion takes place, and thus rendering it impossible for the new pupil to close.

The situation and dimensions of an artificial pupil formed by separation, whether it is to be behind the nasal or the temporal, the superior or the inferior edge of the cornea, and whether it is to be merely a small chink, or a triangular opening, each side measuring a couple of lines, will be determined by the state of the eye in which the operation is to be performed. In the most favourable cases, an artificial pupil by separation assumes the form of a triangle, its base being circular and formed by the ciliary processes, and the two other sides straight lines. But in many instances, we employ this method of operating, when merely a small segment of the cornea remains transparent, and the iris is every where else united to the opaque portion of the cornea, so that the pupil must necessarily be small, and it may be impossible to produce the prolapsus above recommended for preventing the iris from retreating towards the choroid.

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[1] Mémoires et Observations sur l'Œil, pp. 182, 184 ; Lyon, 1772.
[2] Ibid. pp. 185, 186, 187.
[3] Practical Observations on Ectropium, &c. London, 1812.
[4] Mauchart de Synechia, in Haller's Disputationes Chirurgicæ Selectæ, Tom. i. p. 447; Lausannæ, 1755.
[5] See a case of abscission by Dr Ryan, Dublin Hospital Reports, Vol. ii. p. 370.
[6] Wagner de Coremorphosi, p. 22 ; Goettingae, 1818.

SECTION V.—INCISION.[1]

It will be found advantageous, in all the operations for artificial pupil, to lay the patient along on his back, with his head raised on a pillow ; and the assistant should be aware, that in these operations, he will require to support one or other of the eyelids, or both, according as he is directed by the operator. In excision, particularly, both hands of the operator are, at a certain stage of the operation, occupied with the instruments, and cannot therefore be spared for holding open the eyelids.

Although belladonna has in general little or no power over an iris which has suffered such a degree of inflammation as to end in closure of the pupil, there can be no harm in applying it on the evening previous to the operation.

§ 1. *Incision through the Sclerotica.*

The instrument for dividing the iris through the sclerotica, is a

small knife, (*Fig.* 91.) about two-thirds of an inch in length, and the twentieth of an inch in breadth, with a straight back, sharp point, and curved edge, cutting for the length of about three-tenths of an inch. Being single-edged, this instrument can be made to cut much keener than any sort of cataract needle; while, from its small size, it passes through the coats of the eye and the iris with facility.

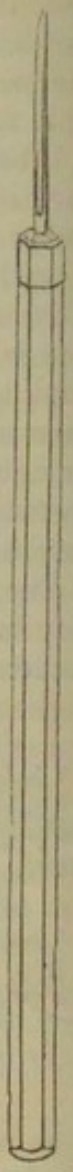


Fig. 91.

The operation divides itself into three periods; namely, *first*, The introduction of the iris-scalpel through the sclerotica and pars non-plicata of the ciliary body; *secondly*, The passage of the instrument through the iris into the anterior chamber; and *thirdly*, The division of the iris.

1*st Period.* The cutting edge being directed backwards, the operator passes the iris-knife through the sclerotica and choroid, exactly in the equator of the eye, at the distance of the sixth of an inch behind the temporal edge of the cornea, and to the depth of the eighth of an inch into the vitreous humour.

2*d Period.* He now carries the handle of the instrument back towards the temple, and at the same time advances its point towards the union of the temporal with the two nasal thirds of the iris; pressing forward its point, he sees it appear between the fibres of the iris, and project into the anterior chamber. He now brings the handle forwards, which has the effect of directing the point of the instrument towards the nasal edge of the cornea, and he pushes it cautiously on through the anterior chamber, as far as he can without touching the cornea.

3*d Period.* It is now by a double motion of the instrument, namely, backwards and outwards, that the iris is to be divided transversely, to the extent of two-thirds of its diameter. This will sometimes be effected by merely pressing on the iris, the knife suddenly starting through that membrane, and thus forming an artificial pupil of the required extent; but more frequently neither mere pressure on the iris, nor one rapid stroke of the edge of the iris-scalpel will suffice, but we must employ repeated strokes, as if we were dividing fibre by fibre, and by a drawing motion of the instrument as well as pressure with its edge. All this must be done gently and cautiously, lest we separate the iris from the choroid.

If our first attempt has not divided the iris to a sufficient extent, the point of the scalpel is to be again carried forward, and again withdrawn until the incision is of the proper length. (*Fig.* 84.) Before finally removing the instrument, we ought to notice, unless the flow of blood from the wounded iris prevents us, whether the artificial pupil expands, and if the edges of the incision do not immediately separate from each other, in consequence of the contraction of the fibres of the iris, we should open up the pupil a little by touching its edges with the flat sides of the instrument. The iris-

scalpel is then to be withdrawn, in the same line of direction as that in which it was introduced.

This method of operating was adopted by Cheselden, in cases of closure of the natural pupil after an operation for cataract, but it has also been occasionally had recourse to, especially by Sir William Adams,[2] in cases in which no attempt has ever been made to remove the opaque lens or capsule out of the axis of vision. When this kind of complication exists, the primary steps of the operation are such as have been already described. In dividing the iris, the capsule and probably the lens also will be cut across, and before withdrawing the scalpel, the operator must endeavour to complete the division of the crystalline body as far as he can. The aqueous humour will by this means be admitted to act upon the fragments of the lens, but should the absorption of these afterwards appear retarded, so that they continue to form an obstacle to vision, in the course of two or three months after the formation of the artificial pupil, the operation of division may be repeated, as in ordinary cases of cataract.

If the iris is adherent to a much thickened capsule, it will be difficult to perform incision in the manner above described, and even were the iris and capsule cut through, it is almost certain that the new pupil would not expand, but its edges speedily unite. If we have proceeded to operate by incision through the sclerotica in such a case, it is needless to attempt the separation of the iris from the capsule. It is preferable to withdraw the scalpel, and at a future period proceed to the formation of an artificial pupil by some other method, better adapted to the circumstances of the case.

§ 2. *Incision through the Cornea.*

1. *With the knife.* At one period of his practice, and in a particular set of cases, Beer adopted a very simple, and, at the same time, sufficiently successful mode of performing incision through the cornea. The cases in question were those, in which, in consequence of prolapsus of the iris after the operation of extraction performed at the lower edge of the cornea, the natural pupil was closed, or at any rate so distorted and hid behind the cicatrice of the cornea, as to be incapable of serving for useful vision, while at the same time the upper half of the iris was dragged down toward the cicatrice, and its fibres put very much on the stretch.

In such cases, Beer introduced obliquely through the upper part of the cornea, and through the iris, a double-edged knife, about one-fifth of an inch in breadth, and shaped exactly like a lancet. (*Fig.* 92.) He thus formed a transverse incision directly behind the

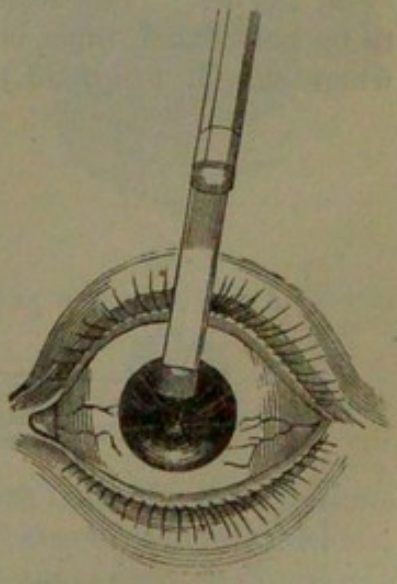


Fig. 92.

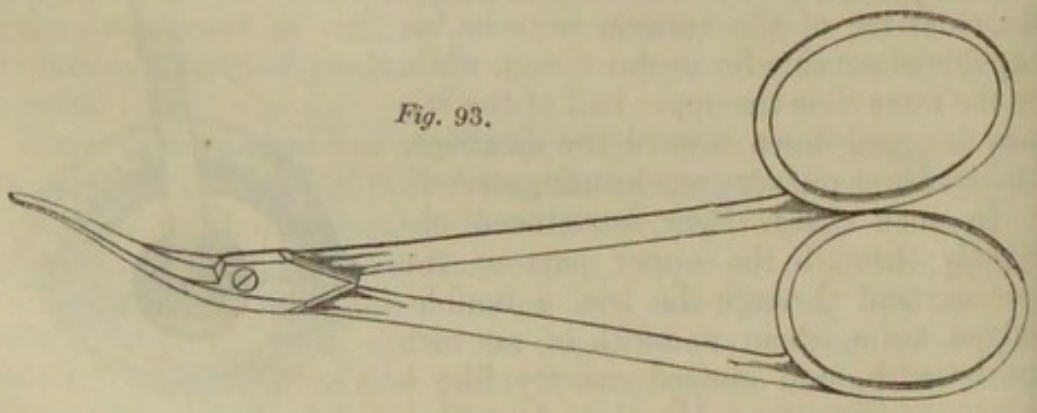
middle of the lucid portion of the cornea, and which, from the tense state of the fibres of the iris, instantly gaped.[3] The same operation may be practised through the lower part of the cornea, when extraction at the upper edge has been followed by prolapsus of the iris.

2. *With the scissors.* We owe this method of operating to Janin,[4] but it has been greatly improved by M. Maunoir of Geneva.[5] Although more complicated in its manipulations than the methods of Cheselden and Beer, it ensures more effectually the desired result; and compared with the operation through the sclerotica, is actually more easy of performance. To divide the iris with Cheselden's scalpel, has often been found extremely difficult or even impossible, whereas with the scissors, the iris, in whatever state it may be, whether thin and unsupported except by aqueous humour in the posterior chamber, or thickened, and perhaps adherent to the capsule, is divided with ease and certainty. Even in cases where the iris projects so as nearly to touch the cornea, M. Maunoir's operation can be performed with comparative facility. There is also much less risk of tearing the iris from the choroid than in Cheselden's method.

1*st Period.* An incision comprehending fully a fourth of the circumference of the cornea, is made close to its edge, and generally towards the temple. If the case is one in which the lens has previously been removed, the incision need not exceed a fourth; but if we contemplate the removal of a cataract through the artificial pupil, more than a fourth of the circumference of the cornea should be laid open. This may be done with the extraction-knife, or a small scalpel, of the same form as the iris-scalpel, but twice its size. The latter instrument is to be passed through the cornea at the point intended to form the upper extremity of the incision, and directed across the anterior chamber; then, as it is withdrawn, the cornea is to be ripped open to the requisite extent. If the extraction-knife is used, the incision is made in a similar way as in opening the cornea in the operation of extraction.

2*d Period.* The scissors, with which the incision of the iris is to be performed, must be made with blades so thin and narrow, that when closed, (*Fig.* 93.) they do not exceed the thickness of a

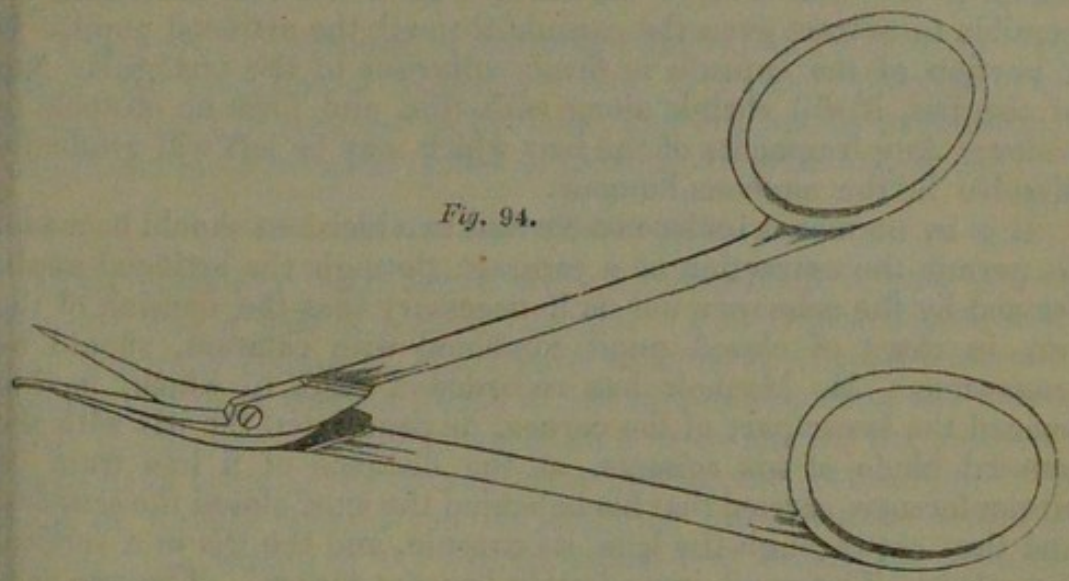
Fig. 93.



small probe, the blades being about three-fourths of an inch long,

and bent so as to form an angle of 160° with the middle line of the handles. The blade, (*Fig.* 94.) which is to pass between the iris

Fig. 94.



and the cornea, is probe-pointed; that which is to penetrate the iris, is sharp-pointed, and about the twentieth of an inch shorter than the other.

The scissors are to be introduced, flat, through the wound of the cornea, till they reach the part of the iris where the incision ought to commence. They are then to be turned one quarter round on their own axis, the handles brought a little forwards, the blades opened, the sharp-pointed blade passed through the iris, and the instrument carried across the eye, with the probe-pointed blade before and the sharp-pointed one behind the iris, as near to the nasal edge of the cornea as it is meant to extend the incision.

3d Period. The scissors are now to be sharply closed, and the iris will be divided. Such is the method of operating with the scissors, when the fibres of the iris are upon the stretch, as in cases of prolapsus after the operation of extraction; but in other cases, and especially when we suspect the substance of the iris to be thickened, or adherent to the capsule, it is proper to make two incisions, (*Fig.* 95.) commencing at the same point, and divaricating from one another at an acute angle. The triangular flap thus formed gradually shrivels up towards its base, leaving a permanent artificial pupil, generally of sufficient size, preserving sometimes a three-sided, but more frequently assuming a quadrilateral figure. (*Fig.* 96.)

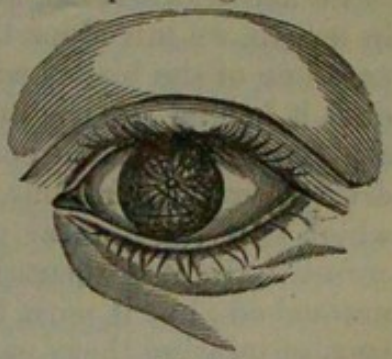


Fig. 95.

Fig. 96.

When closure of the pupil is combined with cataract, the incisions above described will lay open the capsule, and may even divide the lens, the fragments of which the operator ought to endeavour by gentle

pressure to bring forward through the artificial pupil into the anterior chamber, whence they are to be extracted by means of the scoop, if they are soft, or the hook, if hard. It may sometimes be possible to extract even the capsule through the artificial pupil. If a portion of the capsule is firmly adherent to the triangular flap of the iris, it will shrink along with this, and form no obstacle to vision. Any fragments of the lens which may be left will gradually dissolve in the aqueous humour.

It is by no means indispensable that two incisions should be made, to permit the extraction of a cataract through the artificial pupil, formed by the scissors; nor is it necessary that the incision of the iris, in cases of closed pupil combined with cataract, should be transverse. M. Maunoir has recorded a case, in which, having opened the lower part of the cornea, he penetrated the iris with the pointed blade of his scissors, at the distance of a line from its circumference, carried that blade behind the lens, closed the scissors, and thus cut through the lens, its capsule, and the iris in a vertical direction. The pupil immediately became larger. The two segments of the capsule were separated, and showed a broken lens of a bluish-grey colour, the capsule being yellowish-white. The lens was easily extracted, piece by piece, with a small scoop. The larger segment of the capsule was then removed with the forceps. The pupil in the form of a weaver's shuttle, now appearing of a very good size, the other fragment of the capsule was left, lest the taking of it away might have made the pupil too large.[6]

Incision with the scissors may also be practised, when the iris is partially adherent to the cornea, as is often the case, in consequence of prolapsus through a penetrating ulcer, the natural pupil remaining partially open, and the lens and capsule transparent. Having supplied ourselves with a pair of scissors of the same dimensions as those above described, but with both blades probe-pointed and equal in length, we introduce them through a small section of the cornea, pass one of the blades within the contracted natural pupil, and conduct it behind the iris until we see that the other blade has reached the angle between the cornea and the iris. The latter is then to be divided by two incisions, so as to form a triangular flap, the apex of which is in the natural pupil, and the basis behind the edge of the cornea. In this operation the capsule and lens ought to remain untouched; but it must be confessed, that there is more risk, in this way, of injuring those parts, than in the operation of lateral excision, which has therefore been generally preferred in such cases.

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[1] *Corotomia* of the Germans; from *κόρη, pupil*, and *τέμνω, I cut.*

[2] Practical Observations on Ectropium, &c. p. 38; London, 1812.

[3] Assalini, Ricerche sulle Pupille Artificiali, p. 18; Milano, 1811. Wagner de Coremorphosi, p. 20; Gœttingæ, 1818.

[4] Mémoires et Observations sur l'Œil, p. 191; Lyon, 1772.

[5] Mémoires sur l'Organization de l'Iris et l'Operation de la Pupille Artificielle; Paris, 1812. Scarpa, Trattato delle principali Malattie degli Occhi, Vol. ii. p. 118; Pavia, 1816

[6] Medico-Chirurgical Transactions, Vol. ix. p. 287; London, 1818.

SECTION VI.—EXCISION.[1]

There are two varieties of excision, a lateral and a central. The latter, the invention of Wenzel, is now very rarely practised; the former, first had recourse to by Beer, and afterwards by Gibson, is one of the most common modes of forming an artificial pupil.

§ 1. *Lateral Excision.*

The necessary instruments are a knife, a hook or pair of small forceps, and a pair of curved scissors. The cataract-knife is the one generally employed, but I have often used a broad iris-scalpel for ripping open about a fourth of the circumference of the cornea, close to its edge. If the cataract-knife is employed, the incision is made as in opening the cornea in the operation of extraction. The hook or forceps is employed for dragging out a portion of the iris through the wound of the cornea, unless that membrane protrudes spontaneously, when the forceps is generally used for laying hold of the protruding portion, till it is snipt off with the scissors.

The operation divides itself, then, into three periods.

1*st Period.* The incision of the cornea never requires to exceed one-third of its circumference, and sometimes it will be sufficient to open only a fourth. The nasal and lower edge of the cornea is to be preferred, when the state of the parts permits the operator to choose the situation for the artificial pupil. Introducing the point of the iris-knife through the edge of the cornea, and as much across the anterior chamber as the state of the parts permits, the operator, as he withdraws the instrument, enlarges the incision to the requisite extent. If this is done quickly, so as to allow the aqueous humour to issue at once from the eye, the removal of the knife will generally be followed by a portion of the iris, projecting through the wound like a small bag. The incision must be close to the edge of the cornea, else it will be difficult to effect a prolapsus of the iris.

2*d Period.* If no spontaneous prolapsus takes place, the operator with the point of the scoop should open a little the wound of the cornea, at the same time making gentle pressure with the finger on the opposite side of the eyeball, when the iris will frequently appear between the edges of the wound, and may be laid hold of with the forceps. What is laid hold of is to be cautiously drawn out, care being taken to include the edge of the natural pupil in the portion thus prolapsed.

Should no protrusion of the iris take place on pressure, or should the edge of the natural pupil be adherent to the cornea in a considerable part of its extent, so that the iris is prevented from protruding, it becomes necessary to introduce either the hook or the forceps, lay hold of the iris, and cautiously drag out as much as may be sufficient for the formation of an artificial pupil of medium size. In doing this, care must be taken to avoid touching the crystalline capsule, which, in the cases where we have recourse to the operation

of lateral excision, is generally transparent. We must also calculate with care the extent of iris which we are to extract; for if a very small portion only is drawn out, the operation may prove almost fruitless, from the minute size of the artificial pupil which will be formed; on the other hand, if a very large portion is grasped by the forceps or extracted with the hook, the object of the operation may be equally frustrated by the weakness of sight attendant on too large a pupil. The latter error is perhaps that into which the operator is more apt to fall. The snipping out of a flaccid bit of iris, apparently not larger than an ordinary pin-head, will sometimes form an artificial opening much beyond the medium size of the natural pupil. Removing too much of the iris is by far the more serious error of the two, inasmuch as it scarcely admits of any remedy, whereas, if the operator sees that at the first snip he has removed too little, he can either drag out and cut off an additional portion, or enlarge the pupil by incision.

3d Period. The operator, holding with the one hand the piece of iris grasped between the blades of the forceps, with the other employs the scissors for snipping it off. During this period of the operation, it is evident that the lids must be committed entirely to the charge of the assistant. The operator should take care to have the scissors close at hand before laying hold of the piece of iris with the forceps, that he may not be obliged to search for them, in doing which he might readily drag out too much of the iris, or even separate it from the choroid. One of Beer's pupils invented an instrument for this operation, in which a hook and pair of scissors were combined, but which proved too complicated to be easily managed.

If any portion of the iris remains protruding through the wound, it is to be reduced with the point of a probe. The operator is now to rub gently the front of the eye through the medium of the upper eyelid, and then expose it to a pretty bright light, so as to ascertain the form and size of the new pupil. (*Fig.* 87.)

§ 2. *Central Excision.*

It is unnecessary to add any thing to the account of Wenzel's operation which has been given at page 730. Both it, and its modifications by more modern operators, being objectionable on account of the extensive incision of the cornea which they require, are but seldom attempted. Mr Travers, however, tells us, that he has repeatedly, and with perfect success, opened the cornea by a semicircular incision, raised the centre of the iris with the forceps introduced under the flap of the cornea, and clipped off as large a piece of the iris as could be embraced by the convex scissors. He adds, that through such an opening, there will be no impediment to the passage of the lens.[2]

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[1] *Corectomia* of the Germans; from κόρη, *pupil*, ἐκ, *out*, and τέμνω, *I cut*.

[2] Synopsis of the Diseases of the Eye, p. 339; London, 1820.

SECTION VII.—SEPARATION.[1]

§ 1. *Separation through the Sclerotica.*

The operation of forming an artificial pupil by separating a portion of the iris from the choroid, by means of a curved needle introduced through the sclerotica, is now almost entirely laid aside. Even when merely a small segment of the cornea remains transparent, the iris adhering to the opaque part, and scarcely any anterior chamber existing, a case in which it is impossible to bring out any part of the iris through an incision of the cornea, it is not unusual to pass the needle with which the separation is to be attempted, not through the sclerotica, but through the opaque part of the cornea.

§ 2. *Separation through the Cornea.*

Assalini[2] and Buzzi[3] appear to have performed separation through the cornea, the former as early as 1787, with a very small pair of forceps, and the latter with a needle, in 1788. In 1801, Schmidt[4] performed separation by means of a pair of forceps introduced through an opening in the cornea, but afterwards adopted separation through the sclerotica, as not endangering the transparency of the cornea. Himly[5] with a curved needle, and Bonzel[6] with a hook, also performed separation through the cornea. None of these operators, however, attempted to prevent by any particular means the return of the separated iris towards the choroid, an event which is extremely apt to happen, if, as is often the case when an artificial pupil is required, the substance of the iris has previously suffered severely from inflammation.

Langenbeck[7] was the first to whom it occurred to drag out, through the wound of the cornea, the portion of iris which is separated from the choroid, and by allowing the protruded piece to unite to the lips of the wound, to prevent in this way the closure of the new pupil. For effecting the separation, he employed a single hook, which is, perhaps, the best instrument for the purpose. On the ground, however, that a simple hook is apt, instead of separating the iris from the choroid, to tear it through, or to let it go after the separation is commenced, a variety of more complicated instruments have been invented. One of these we owe to Dr Reisinger.[8] It consists of two delicate hooks laid side by side, which when shut (*Fig.* 97.) are no thicker than a common single hook. In this state they are introduced into the anterior chamber, but by their elasticity they separate from one another, (*Fig.* 98.) and thus serve to lay hold of the iris at two different points, and, being again brought together, seize that membrane also as a pair of forceps.

In 1817, Langenbeck[9] invented an instrument (*Fig.* 99.) for effecting the separation of the iris, consisting of a steel wire, terminating in a fine hook, which slides within a slender gold tube, the

latter being fixed into one end of a thick silver tube, within which is a spiral spring. By means of a knob, the hook is protruded in the same way as a pencil is pushed out of a pencil case. When the

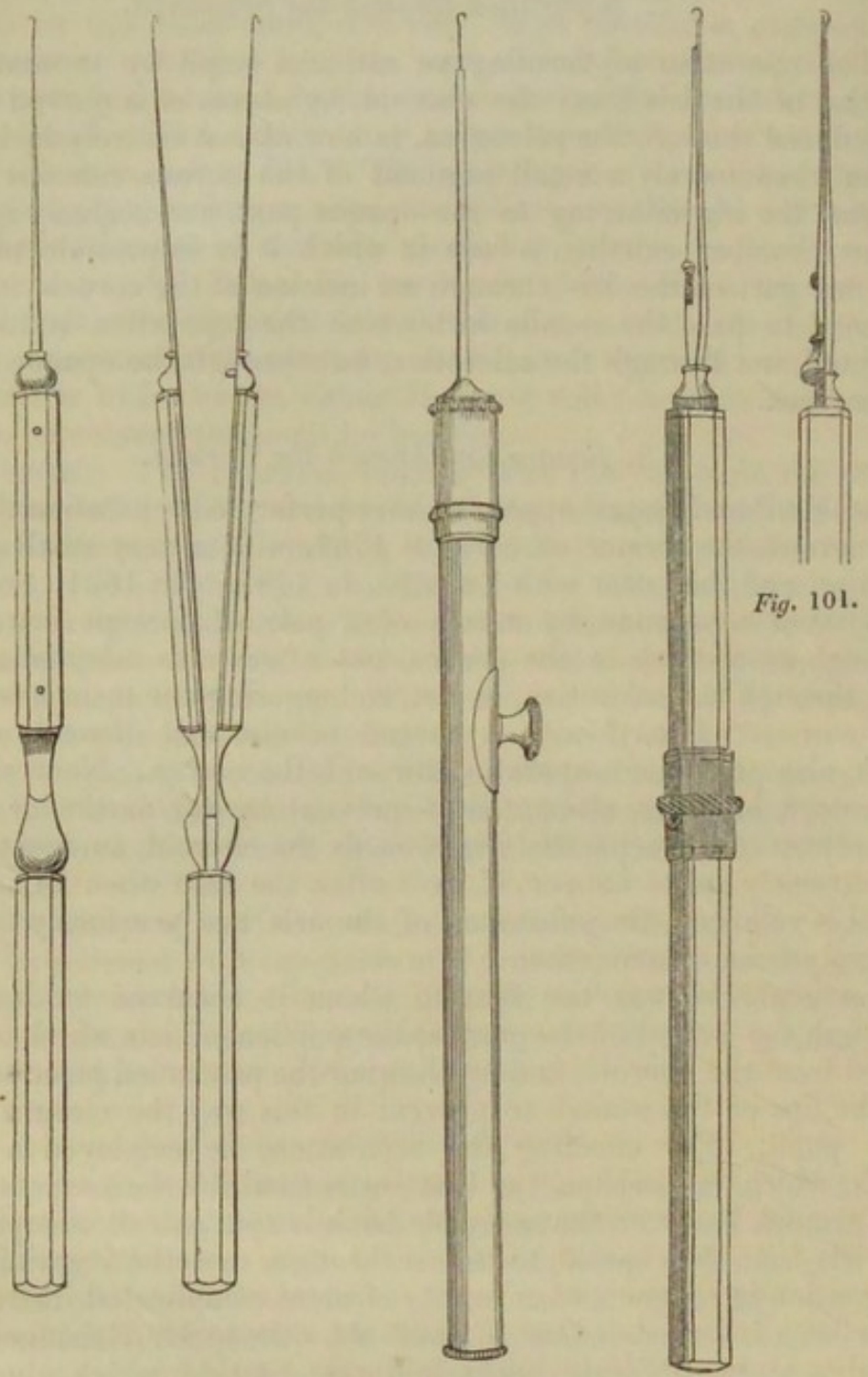

Fig. 101.

Fig. 97. *Fig.* 98. *Fig.* 99. *Fig.* 100.

pressure on the knob is withdrawn, the spiral spring serves to retract the hook. The iris being laid hold of where it is attached to the choroid, the spiral spring is allowed to operate in effecting the separation, till the concave side of the hook presses the piece of iris, which it has transfixed, into contact with the end of the small gold tube. Thus the iris is fixed, so that it cannot escape during the rest of the operation, nor till it is fairly prolapsed between the lips

of the wound of the cornea. This instrument requires a very small incision for its introduction, and is not apt to catch in the cornea as it is withdrawn.

Upon a similar principle, Gräfe invented[10] his *coreoncion* or iris-hook, which, as improved by Dr Schlagintweit,[11] is represented open in *Fig.* 100, and shut in *Fig.* 101. The hook is of steel, the sliding branch of silver, and being moved forwards by the thumb applied on the ferrule which surrounds the handle of the instrument, it comes to fill up the concavity of the hook, and so fixes the piece of iris which is laid hold of, that it cannot escape.

It is worthy of notice, that Dr Jüngken, who took the trouble to publish a work on Gräfe's coreoncion, in a later publication[12] renounces the use both of it and of all other complicated instruments for effecting the separation of the iris, and recommends in cases where the texture of the iris is healthy, a simple hook, and where it is changed by disease, a small pair of toothed forceps, such as that represented at page 208, but reduced in size.

The hooks of Langenbeck and Schlagintweit are too small. I prefer a simple hook, of the size represented in *Fig.* 102, to any other.

The operation of separation divides itself into four periods; viz. *first*, the incision of the cornea; *secondly*, the introduction of the hook and laying hold of the iris; *thirdly*, the separation, properly so called; and *fourthly*, the strangulation of the separated piece of iris between the lips of the wound of the cornea.

1*st Period.* The situation of the incision through the cornea will of course vary with circumstances; but care must always be taken that it be neither too near nor too far from the edge of the cornea behind which the artificial pupil is to be formed. We shall suppose that this is to be done behind the nasal edge of a cornea, the transverse diameter of which measures $\frac{5}{10}$ths of an inch. In this case, the incision should be made in a vertical direction, at the distance of $\frac{3}{10}$ths from the nasal edge, or at any rate not nearer to that edge than the centre of the cornea. Were the incision nearer than this to the nasal edge, behind which we have supposed that the artificial pupil is to be formed, the separation of the iris would be too limited to form a pupil of sufficient size, and should an opaque cicatrice result from the incision of the cornea, this would necessarily cover the new pupil, and frustrate the object of the operation. On the other hand, were the incision much farther from the nasal edge, the artificial pupil would be enormously large, in consequence of our continuing to detach the iris till a sufficient portion of it was drawn through the incision. But by making the incision at the distance of $\frac{3}{10}$ths of an inch from the edge of the cornea behind which the separation is to be effected, the result will be a triangular pupil of moderate size.

The incision will, in some cases, require to be made through a lucid portion of the cornea, and in others through one which is opaque. This is a matter of indifference, except only that we see

better how to continue the operation when the part of the cornea which is opened is transparent. It is important that the length of the incision should equal $\frac{2}{10}$ths of an inch; for if smaller it will be difficult, or even impossible, to effect through it the necessary protrusion of the iris. If Reisinger's double hook is used, unless the incision measure fully two-tenths, it will not allow the instrument to open so as effectually to lay hold of the part to be separated. If, on the other hand the incision is too extensive, the piece of iris which is protruded will not be strangulated with sufficient force by the lips of the incision, but will be apt to escape again into the anterior chamber, and return towards the choroid.

A double-edged knife has been recommended for making the incision, being pushed obliquely through the cornea, and across the anterior chamber, till its point reaches that edge of the iris which is to be separated from the choroid. To make the incision of sufficient length in this way, the knife would require to be entered at the distance of at least $\frac{3}{10}$ths of an inch from that edge of the cornea behind which the artificial pupil is to be formed. Its edges would also require to divaricate from each other at an angle of 36°. Pushing, then, the point of the instrument obliquely through the cornea, it is to be carried through the anterior chamber, till it reaches the angle between the cornea and iris, on that side of the eye where the artificial pupil is to be formed, and immediately withdrawn. The incision will generally be vertical in its direction, when the pupil is to be either at the nasal or temporal edge of the cornea; and horizontal, if it is to be at the upper or lower edge; but it is not necessary that it should be always so, or parallel to the basis of the intended pupil. It may be oblique, as is shown in *Fig.* 102, where the hook is represented as introduced through an oblique incision, the lower edge of the iris being about to be separated.

The incision must not be made perpendicularly to the lamellæ of the cornea, but obliquely; else it will be difficult, if not impossible, to effect the protrusion of the separated piece of the iris.

2d Period. It is desirable that the sudden withdrawing of the knife, aided by the obliquity of the incision, should prevent the aqueous humour from being discharged till the hook is introduced, which the operator slides, flat, with its point turned downwards, along the surface of the eye, till it slips into the incision. He then carries it rather rapidly through the anterior chamber, till it reaches the angle between the cornea and iris, and is even a little way behind the sclerotica, so that it may be applied to that part of the iris which covers the ciliary processes. Turning its point round towards the iris, the operator lays hold of its ciliary edge with the hook, which he continues to turn on its axis, till its point is directed upwards.

If Reisinger's double hook be used, the two branches of the instrument are to be pressed together, so that it is like a single hook. In this state, it is introduced through the anterior chamber, as far as the edge of the iris which is to be separated from the choroid.

Having turned it round so that its points look towards the iris, the operator slowly relaxing his grasp of the instrument, allows its two branches to expand, and immediately lays hold of the edge of the iris with the two hooks, thus separated from each other. He next closes the instrument, so that the two hooks again approach each other, carrying the iris with them, and laying hold of it as with a pair of forceps. He then turns it on its axis till its points are directed upwards.

3*d Period.* Very slowly the operator now draws the hook through the anterior chamber towards the incision of the cornea, carrying with it the iris, between which, and the edge of the cornea, he perceives the artificial pupil gradually formed. During this period, the instrument must be kept as close to the cornea as possible, in order to avoid any injury of the crystalline capsule; and as this is the most painful part of the operation, care must be taken to keep the patient's head steady, and to guard against his raising his hand to his eye. The pupil, as it is formed, fills with blood, so that it is often impossible to discern the state of the lens and capsule.

4*th Period.* The operator now requires to move the handle of the instrument, so that the convex edge of the hook or hooks may slip easily out of the incision; for if any difficulty occurs in bringing out the instrument, the operator is apt, in attempting to obviate it, to lose hold of the piece of iris which he has separated. The portion to be protruded rarely requires to exceed the size of a pin's head. (*Fig.* 103.) This, however, must vary in particular cases, for it some-

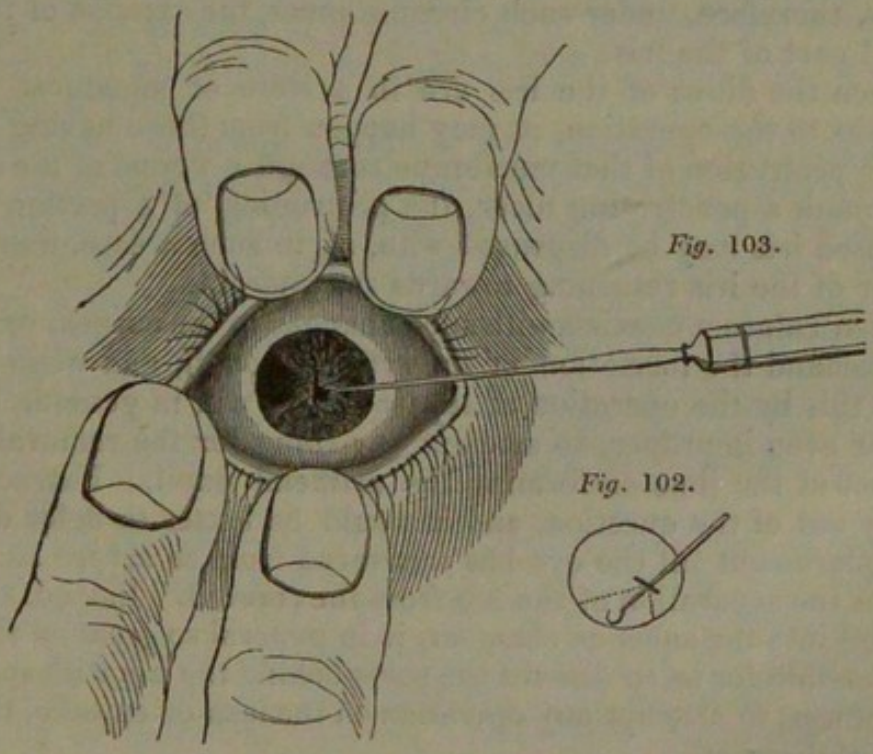

Fig. 103.

Fig. 102.

times happens, from the great extensibility of the iris, that the pupil will not be of sufficient size, unless the separation is continued even after the hook is brought out of the eye; while in cases where the iris is much diseased in texture, and its extensibility thereby greatly

diminished, it is sometimes found difficult to effect a protrusion at all. The operator must be cautious of allowing the branches of the double hook to separate, or of letting go his hold of the iris, till he sees that he has fully accomplished this part of the operation, and that the protrusion appears to be retained by the lips of the incision, which will be done more effectually by carrying the protruded portion of the iris from the middle of the incision towards either of its extremities. The instrument is then to be freed from the protruding part of the iris.

The eye should now instantly be shut, in order, by the pressure of the lids, to assist in strangulating the protruding portion of the iris. After a few minutes, the eye may again be opened, in order to ascertain the state of the prolapsus. Should this have disappeared, by the iris having retracted, which is not likely to happen unless the incision of the cornea is too large, the instrument ought to be re-introduced, the separate part again brought out, and to ensure the object of the operation, the protruding portion snipt off with the scissors, thus combining excision with separation.

Should the application of the double hook not effect a satisfactory separation, but rather tear the iris, which is likely to happen only when its texture is much changed by disease, the portion which is protruded will, in all probability, be too small to remain fixed in the wound of the cornea, and will be apt therefore to recede, the consequence of which will be that the pupil will be too small, and will in general be seen filled up by effused lymph. Reisinger recommends, therefore, under such circumstances, the excision of the protruded part of the iris.

When the fibres of the iris are in a state of unnatural tension previous to the operation, as may happen from there having been a former protrusion of that membrane through a wound of the cornea, or through a penetrating ulcer, the protruding of a portion of the separated iris may be dispensed with, as, in such a case, there is no danger of the iris returning towards the choroid.

When cataract coexists with such changes in the cornea, or iris, as may demand the formation of an artificial pupil, and when we attempt this by the operation of separation, it will in general be useless, or even improper, to attempt any thing for the removal of the cataract at the time of forming the artificial pupil. Extraction is plainly out of the question, and it would be better to defer division or displacement till the eye has recovered from so severe an operation, as the separation of the iris from the choroid. Indeed, the flow of blood into the aqueous chamber, is in general so great as to make it impossible for us to discern the parts behind the iris with sufficient distinctness, to attempt any operation on the lens or capsule, till that blood is absorbed.

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[1] *Corodialysis* of the Germans ; from *κόρη, pupil,* and *διαλύω, I loosen.*

[2] Ricerche sulle Pupille Artificiali, p. 11 ; Milano, 181.

[3] Ibid. p. 15.

[4] Ophthalmologische Bibliothek von Himly und Schmidt, Vol. ii. p. 31; Jena, 1803.

[5] Wagner de Coremorphosi, p. 36; Gœttingæ, 1818.

[6] Journal der practischen Heilkunde, von Hufeland und Harles, für Januar, 1815, p. 47.

[7] Wenzl über den Zustand der Augenheilkunde in Frankreich und Deutschland, p. 107; Nürnberg, 1815.

[8] Darstellung einer leichten und sichern Methode künstliche Pupillen zu bilden, p. 29; Augsburg, 1816.

[9] Neue Bibliothek für die Chirurgie und Ophthalmologie; Vol. i. p. 454; Vol. iii. p. 106; Hanover, 1818, 1819.

[10] Das Coreoncion; ein Beitrag zur künstlichen Pupillenbildung, von Ch. Jüngken, p. 61; Berlin, 1817.

[11] Ueber den gegenwärtigen Zustand der künstlichen Pupillenbildung in Deutchland; München, 1818. Gräfe, after some time, endeavoured to improve this coreoncion, by splitting the hook into two, so as to resemble in some degree Reisinger's double hook. See Langenbeck's Neue Bibliothek; Vol. ii. p. 58.

[12] Lehre von den Augenoperationen, p. 656; Berlin, 1829.

SECTION VIII.—COMPOUND OPERATIONS FOR THE FORMATION OF AN ARTIFICIAL PUPIL.

1. I have already mentioned the combination of separation with excision, which has been recommended, when the separated portion of the iris is found to recede towards the choroid, or when it is too small to remain fixed in the wound of the cornea. In such cases, there can be no question of the propriety of bringing out the separated portion of iris through the incision of the cornea, and removing it with the scissors.

2. Another compound operation was proposed by Donegana,[1] namely, separation with incision, but which scarcely deserves to be particularly noticed. The instrument employed by him was a falciform needle, with which, introduced through the sclerotica, he first separated a portion of the iris from the choroid, and then endeavoured to divide the iris from its circumference towards its centre. The latter part of the operation, it must be difficult to accomplish. Indeed, it is hardly possible, by the pressure even of the sharpest instrument, to effect a division of the iris, after separation has once commenced.

3. It is sometimes found advantageous to add incision to excision. Thus, in a case of extensive opacity of the cornea, with adherent iris, a segment at the lower edge of the cornea remaining transparent, I first formed an artificial pupil towards one extremity of the segment by excision, but regarding it as too small, instead of attempting an additional excision, I introduced Maunoir's scissors, and divided the iris transversely, so as to enlarge the artificial pupil to a medium size.

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[1] Della Pupilla Artificiale; Milano, 1809.

SECTION IX.—ACCIDENTS OCCASIONALLY ATTENDING THE FORMATION OF AN ARTIFICIAL PUPIL; AFTER-TREATMENT.

Many of the accidents which are apt to attend the formation of an artificial pupil, are similar to those which accompany or follow the operations for cataract, and need not be particularly insisted on. A few, however, are peculiar.

1. On making a section of the cornea, for the purpose of forming an artificial pupil by excision or by separation, a portion of the vitreous humour is sometimes instantly evacuated through the wound, the hyaloid being in a weak state. This may happen even when the lens is transparent. Under such circumstances, it is not probable that the retina is altogether sound. The operation must be proceeded with as gently and as expeditiously as possible.

2. In whatever mode an artificial pupil is formed, blood is apt to be effused; more in separation, however, than in the other operations, especially when the iris is altered from its natural texture in consequence of inflammation. In separation, the trunks of the blood-vessels which nourish the iris are torn across, while after long-continued inflammation, the iris is thickened and loaded with blood. The bleeding after separation, and sometimes after excision, is so considerable, that it goes on for a few minutes through the wound of the cornea. Filling the aqueous chambers, the blood prevents us from making any experiments regarding the degree of vision likely to be recovered by the operation. In 24 hours, in general, the pupil becomes clear. Indeed, it is remarkable, with what celerity a large quantity of blood is absorbed from the aqueous chambers.

3. In attempting incision in Cheselden's method, the iris is liable to be torn away in part from the choroid, instead of being divided, or to be both divided and torn away. The accidental separation may take place at any part of the circumference of the choroid, but I believe it happens, contrary to what might have been expected, oftenest at the nasal edge. The pupil formed by the separation is likely to continue open, if the substance of the iris is pretty healthy, and thus the patient may have two artificial pupils. I have seen the one by incision close, and the one by separation remain open, and prove useful. It will as frequently happen either that no pupil is formed by incision when the iris separates in this way from the iris, or that both pupils close from inflammation.

4. Little or no pain attends incision or excision; but it is otherwise with separation, owing to the tearing across of the ciliary nerves, attendant on this method of forming an artificial pupil. The pain of separation is always considerable, and often severe, rendering necessary the use of opium after the patient is put to bed. During the operation the assistant requires to be on his guard, lest the patient suddenly moves away his head when he feels the pain, an accident which might lead to the separation of a much greater por-

tion of the iris than the operator intended, or could be consistent with useful vision.

5. It sometimes happens in the course of an operation, that facts come to light or circumstances occur, sufficiently pressing to make the operator change his determination in regard to the kind of operation he should perform. For instance, if he open the cornea with the view of forming an artificial pupil by incision with Maunoir's scissors, and the section of the cornea is instantly followed by a large protrusion of the iris, which I have seen happen even when the pupil was closed and its circumference adherent to the capsule, he should abandon the idea of incision, and form the new pupil by excision.

6. Should the operator find, that he has formed too small a pupil to be very useful, he ought immediately to enlarge it, either by repeating the operation which he has been performing, or by converting it into some of the compound operations described in the preceding section. It must be observed, however, that an artificial pupil will often appear small immediately after it is formed, and while the eye is drained of aqueous humour, which, after the eye becomes plump, will be found of fully a medium size.

7. When too large an artificial pupil has been formed, so that the eye is dazzled even by moderate light, it is necessary that the patient should shade the eyes, or wear a piece of pasteboard or light wood, concave within and convex without, blackened on both sides, and pierced in the centre with a round hole of the size of the natural pupil. This will enable him to see at least all large objects, although he will probably be unable to distinguish small ones even with the aid of this contrivance.

8. The treatment of patients who have undergone an operation for artificial pupil, refers chiefly to the danger of inflammation coming on in the eye, and especially internal inflammation. The patient for some days must remain in bed, his eyes excluded from bright light, and his diet strictly antiphlogistic. Belladonna may be applied when the pupil has been formed by incision or excision, but ought to be avoided (at least immediately) after separation. Should pain in the eye, or round the orbit, supervene, venesection ought freely to be employed, followed up by the application of leeches. Calomel, with opium, ought instantly to be begun, in such doses as are likely speedily to affect the mouth, and continued till all danger of iritis seems past. The inflammation excited by an operation for artificial pupil often partakes of the scrofulous character, and not unfrequently is scrofulo-catarrhal. Depletion, in such cases, does not require to be carried to the same extent as when the inflammation is internal; and much benefit will be derived from the administration of the sulphate of quina.

9. The degree of vision recovered by the formation of an artificial pupil necessarily varies according to the condition of the eye before it was operated on, the kind of pupil which has been formed, and the effects of the operation on the various textures of the eye. If the lens has been removed, either before the formation of the

artificial pupil, at the same time, or afterwards, cataract-glasses will be required. If the patient is short-sighted or long-sighted, but the lens entire, he will still be obliged to employ concave or convex spectacles. So far as any other sort of imperfect sight is concerned, no glass will be of any use to him.

It often happens, that those in whom an artificial pupil has been formed, present, in the first instance, but very dubious signs of sensibility of the retina; so much so, that the operator may be led almost to despair of a restoration to sight. I have known a fortnight elapse after all signs of inflammation had subsided, before the patient could tell one finger from another, and yet very tolerable vision be recovered.

SECTION X.— SCLERECTOMIA.

This name is applied to the attempt which has sometimes been made to form an artificial pupil by the removal of a small portion of sclerotica and choroid, in cases where the whole cornea is opaque, in the hope that the space might be filled up by a transparent membrane. As all such attempts have failed, I hold it unnecessary to do more than refer the reader to the works where he will find the details.[1]

[1] Schmid de Pupilla artificiali in Sclerotica aperienda; Tubingæ, 1814. Ammon, in Zeitschrift für die Ophthalmologie, Vol. i. p. 109; Dresden, 1831. Wutzer, in Ibid. p. 486. Ullmann, in Ibid; Vol. ii. p. 123; Dresden, 1832. Nimmo, in Glasgow Medical Journal for April 1833.

Akin to sclerectomia, is transplantation of the cornea; on which see Bigger in Dublin Journal of Medical Science, Vol. xi. p. 408.

CHAPTER XX.

PRETERNATURAL STATES OF THE IRIS, INDEPENDENT OF INFLAMMATION.

SECTION I.—MYOSIS.[1]

Symptoms. The pupil is very considerably below the medium size, perfectly regular, extremely limited and slow in its motions, scarcely dilating at all when the patient passes into a dark place,

and yielding little even to the influence of belladonna. The patient's vision is obscure, especially in weak light, in some cases he sees only during certain hours of the day, and when the myosis is complete, he is almost totally blind. The complaint is attended by pains in the head, especially in the forehead; and the subjects of the disease are, in general, debilitated or cachectic individuals.

Proximate cause. The proximate cause is in fact unknown; but has been supposed to be, in some cases, of a spasmodic nature, and in others paralytic. Plenck admits a *spasmodic* myosis, accompanying hysterical and other nervous diseases, and attributable to spasm of the orbicular fibres of the iris; and a *paralytic* myosis, arising from palsy of the straight fibres, and attendant on paralytic diseases.[2]

It is worthy of observation, that contraction is the natural state of the pupil during sleep.[3] Under the influence of a full dose of opium, also, the pupil becomes greatly contracted.[4]

The probability is, that myosis does not so much depend, in general, on any disease directly affecting the substance of the iris, as on some morbid change of the nerves by which this membrane is animated and excited to motion; and hence, in certain cases, myosis comes to be conjoined with amaurosis.

Exciting causes. Frequent and long-continued employment of the eyes in the examination of minute objects, especially of those which reflect the light strongly, induces a habitual contraction of the pupil; and this ends in an inability of this aperture to expand, even when the eyes are exposed to feeble light. Those who read or write much by candle light, embroiderers, watchmakers, setters of jewels, and the like, are thus exposed more than others to myosis.

Treatment. The few well-marked cases of this disease which have fallen under my observation, appeared to be scarcely at all benefited by any mode of treatment. Temporary dilatation of the pupil by belladonna only increased the weakness of sight by which the myosis was accompanied. Antispasmodic and antiparalytic remedies are recommended in the treatment of this disease; but probably more good will be effected by carefully guarding against the exciting causes of the disease, than by medicines of any kind. The eyes should be shaded; reading, writing, and similar laborious occupations of the sight, should be avoided; exercise in the country should be enjoined; and the patient should retire to rest at an early hour.

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[1] From *μύω, I shut.*

[2] De Morbis Oculorum, p. 120; Viennæ; 1777. The same notion was promulgated by Mauchart, in his dissertation De Pupillæ Phthisi.

[3] Fontana dei Moti dell' Iride; Lucca, 1765. Janin, Mémoires et Observations sur l'Œil, p. 8; Lyon, 1772. Cuvier, Leçons d'Anatomie Comparée, Tome ii. p. 409; Paris, 1805.

[4] Christison's Treatise on Poisons, p. 653; Edinburgh, 1836.

SECTION II.—MYDRIASIS.[1]

A preternatural dilatation of the pupil is styled *mydriasis;* the pupil, in general, no longer contracting, even although the eye be directed to a near object, or exposed to a bright light. Very frequently, this is merely one of the symptoms of certain kinds of amaurosis; such as, the hydrocephalic. In other cases, it accompanies palsy of the muscles stimulated by the motor oculi. But occasionally mydriasis occurs independently of any other affection, and when this is the case, the dilatation sometimes exists to such a degree, that only a narrow rim of iris remains in view. Of course, in this state of the pupil, the eye is so much dazzled by the uncontrolled influx of light, that the patient is unable, especially in broad day, to look steadily at any object, or to discern any thing with distinctness. Near objects especially appear dim and confused. By looking through a hole in a card, however, the dazzling effect of too much light is prevented, spherical aberration is again obviated, and the vision of the eye affected with mydriasis is greatly improved. In some cases, the improvement is such that the patient is even able to read; and this fact constitutes one of the chief grounds of diagnosis between the sympathetic dilatation of the pupil which attends amaurosis, and idiopathic mydriasis. Demours had never seen mydriasis in both eyes.

Causes. Different species of idiopathic mydriasis have been distinguished by authors; such as, the *paralytic*, arising from palsy of the supposed sphincter fibres of the iris, and the *spasmodic*, from spasm of the straight fibres. The mydriasis which follows the application of belladonna, and some similar narcotics, and of which so much advantage is taken in the treatment of inflammation of the iris, and in certain operations for cataract, is generally regarded as paralytic; but it is evident that this is entirely a gratuitous assumption. An occasional cause of mydriasis is the passage of a large cataract through the pupil in the operation of extraction. Preternatural distention is supposed in this instance to give rise to atony of the iris, which, generally after a few days, wears off, so that the pupil contracts to its former diameter. Blows on the eye, and blows or falls on the head[2] sometimes induce mydriasis, without any affection of the optic nerve. Rarely is it the case, that any signs of cerebral disorder are attendant on simple dilatation of the pupil. Sometimes mydriasis is attended with neuralgia in the branches of the fifth nerve, especially the supraorbitary branch.[3] Mr Ware observes, that most of the persons with mydriasis whom he had seen had been debilitated by fatigue or anxiety before the disease of the eye was discovered; and that in some it had been preceded by affections of the stomach and alimentary canal.

To mydriasis, amaurosis is sometimes superadded. In other cases, amaurosis has been known to attack an eye which had been cured of mydriasis.

We are as unable to explain the proximate cause of mydriasis as of myosis. Both probably depend on some peculiar change affecting the third nerve, the ophthalmic ganglion, or the ciliary nerves.

We are indebted to Dr Wells and Mr Ware for two interesting cases of mydriasis.

Case 275.—Dr Wells was consulted by a gentleman, about 35 years of age, very tall, and inclining to be corpulent, who, about a month before, had been attacked with a catarrh, and as this was leaving him, was seized with a slight stupor, and a feeling of weight in his forehead. He began at the same time to see less distinctly than formerly with his right eye, and to lose the power of moving its upper lid. The pupil of the same eye was also observed to be much dilated. In a few days the left eye became similarly affected with the right, but in a less degree. Previous to this ailment, the patient's sight had always been so good, that he had never used glasses of any kind to improve it. On examining the eyes, Dr Wells could not discover in them any other appearance of disease, than that their pupils, the right particularly, were much too large, and that their size was little affected by the quantity of light which passed through them. At first, he thought that their dilatation was occasioned by a defect of sensibility in the retinæ; but he was quickly obliged to abandon this opinion, as the patient assured him that his sensation of light was as strong as it had ever been during any former period of his life. Dr Wells next inquired whether objects at different distances appeared to him equally distinct. He answered, that he saw distant objects accurately, and in proof told what the hour was by a remote public clock: but he added, that the letters of a book seemed to him so confused, that it was with difficulty he could make out the words. He was now desired to look at a page of a printed book, through convex glasses. He did so, and found that he could read it with ease. "From these circumstances," observes Dr Wells, "it was very plain, that this gentleman, at the same time that his pupils had become dilated, and his upper eyelids paralytic, had acquired the sight of an old man, by losing suddenly the command of the muscles, by which the eye is enabled to see near objects distinctly; it being known to those, who are conversant with the facts relating to human vision, that the eye in its relaxed state is fitted for distant objects, and that the seeing of near objects accurately, is dependent upon muscular exertion."[4]

Case 276.—Mr Ware has recorded the case of a lady, between 30 and 40 years of age, the pupil of whose right eye, when she was not engaged in reading, or in working with her needle, was always dilated very nearly to the rim of the cornea; but whenever she looked at a small object nine inches from the eye, it contracted within less than a minute, to a size nearly as small as the head of a pin. Her left pupil was not affected like the right; but in every degree of light and distance, was contracted rather more than is usual in other persons. The vision was not precisely alike in the two eyes; the right eye being in a small degree near-sighted, and receiving assistance from a shallow concave glass, whereas the left eye derived no benefit from it. The remarkable dilatation of the pupil of the right eye had existed for 20 years. A variety of remedies had been employed at different times to correct it, but none of them had made any alteration.

Mr Ware mentions particularly, that, in order to produce the contraction of the dilated pupil in this case, the object looked at required to be placed exactly nine inches from the eye. If it were brought nearer, it had no more power to produce the contraction, than if it were placed at a remoter distance. It was also observed, that the continuance of the contraction of the pupil depended, in some degree, on the state of the lady's health; since, although the contraction never remained long after the attention was withdrawn from a near object, yet whenever the patient was debilitated by any temporary ailment, the contraction was of much shorter duration than when her health was entire.[5]

Prognosis. Demours,[6] who appears to write on mydriasis fully more from experience than most other authors, pronounces rather a favourable prognosis in this disease. He says, that when it has not

been the effect of a contusion or serious wound of the eye, he has generally seen it yield, and diminish one half in the space of the first six months, even in those who employed no means of cure. What remains of the disease disappears much more slowly. He had witnessed complete restoration of the pupil to its natural size, even after a contusion of the eye, although in such cases recovery is extremely rare. The result of his observations was, that seven cases out of nine proceed towards a cure, even without any treatment; and that little more can be done than to accelerate the cure, chiefly by the use of external stimulants.

Treatment. The remedies which have been found most useful in mydriasis are blood-letting and a spare diet, followed by such applications as are likely to excite contraction of the pupil. Vinum opii may be dropped upon the eye once a-day or oftener, electric sparks may be drawn from the eye and surrounding parts, the brow and temple rubbed morning and evening with a stimulating liniment, or with a tincture of nux vomica, and blisters applied above the eyebrow or behind the ear, and the raw surface dusted with strychnia. Ammoniated tincture of valerian, taken internally, has been found useful. From half a drachm to a drachm may be given thrice a-day.

Demours remarks, that, if any acrid liquid is dropped upon an eye affected with mydriasis, even although the dilatation of the pupil has been carried to the utmost degree, that aperture instantly contracts nearly one half, and the patient recovers for a minute or two the power of seeing such minute objects as previously he has been able to distinguish only by looking through a hole in a card or similar small opening. The stimulating practice followed by Demours consists in directing small electric sparks against the eye, then rubbing it gently for about half a minute with the end of a silver probe bent into the form of a ring, and immediately afterwards dropping in upon it a cold infusion of tobacco.

M. Serres, of Uzès, has ventured to treat mydriasis, (or, as he terms it, idiopathic paralysis of the iris, without affection of the retina and optic nerve,) by the application of nitrate of silver to the cornea near its junction with the sclerotica, and has found this a more powerful and useful excitant than the means recommended by Demours. In a memoir presented to the Royal Academy of Medicine, he related four cases in illustration of the success of his method, and the committee of the Academy to whom the subject was referred, found the application of the caustic, in the manner directed by M. Serres, efficacious in three other instances. The caustic should be applied for one second. It produces redness of the external vessels of the eye, followed by a copious secretion of tears and of the nasal mucus, with smart pain in the forehead and cheek. The slight cloud which appears on the cornea, in consequence of the application, rarely continues above a few days. The committee of the Academy observed that this means of cure, totally useless in amaurosis, could be of service only in those idiopathic palsies of the iris

arising from an affection of the ciliary nerves, or of the other branches of the 3d and 5th pairs.[7]

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[1] From *ἀμυδρὸς, obscure ;* or from *μυδάω, I abound in moisture,* because it was thought to depend on redundant moisture.
[2] Brodie, in Medico-Chirurgical Transactions, Vol. xiv. p. 354; London, 1828.
[3] London Medical Gazette, Vol. xxii. p. 68.
[4] Philosophical Transactions, Vol. ci. p. 378 ; London, 1811.
[5] Ibid ; Vol. ciii. p. 36 ; London, 1813.
[6] Traité des Maladies des Yeux, Tome i. p. 444 ; Paris, 1818.
[7] Archives Générales de Médecine, Tome xvii. p. 307 ; Paris, 1828.

SECTION III.—TREMULOUS IRIS.

The cases in which the iris is affected, on every movement of the eye, with a peculiar tremulous or undulatory motion, are very various, and by no means unfrequent. In some, the waving motion of the iris is very striking ; in others, it is seen only when the eye is considerably moved, and even then, it may be so slight, that it must be watched, to be observed. The texture of the iris, in such cases, is apparently uninjured, and the pupil generally of its natural form; but the membrane seldom appears to retain any power of contracting or expanding. I have seen it, however, from sympathy with the pupil of the other eye, which was healthy, move briskly and extensively.

A tremulous state of the iris is frequently, but not necessarily, connected with amaurosis. We meet with it combined with cataract, and especially with capsulo-lenticular cataract. It is extremely apt to follow an operation for the removal of capsulo-lenticular cataract. It often results from a blow on the eye, and in this case is generally attended by a partial or complete insensibility of the retina, and opacity of the lens. I have seen it follow a small punctured wound of the sclerotica and choroid, immediately behind the edge of the cornea. In those born amaurotic, or affected with congenital cataract, tremulousness of the iris is often met with; and in such subjects, it is attended by oscillation of the eyeball. (See page 292.)

When this disease of the iris is combined with cataract, the latter not unfrequently partakes of the tremulous motion. After operations for cataract, and especially after operations on eyes, the vitreous humour of which has been found dissolved, or from which a considerable quantity of the vitreous humour has been evacuated, the iris frequently presents this undulatory motion.

In almost all cases of tremulous iris, there appears to be a larger quantity of aqueous fluid in the posterior chamber than natural; and in many of them, the whole cavity behind the iris is filled with fluid, in consequence of destruction of the hyaloid septa. The iris hangs loose, and is unable to resist those undulations of the aqueous

humour which take place whenever the eye is turned from one side to another by the action of its muscles. It is then only, in fact, that the tremulousness of the iris is perceptible. We do not observe it so long as the patient fixes his attention on the same object, nor does the attempt to accommodate the eye to objects placed at a variety of distances, but in the same right line, appear to produce the motion in question.

This affection of the iris has hitherto been regarded as incurable, and certainly it affords an unfavourable index of the state of the vitreous humour and retina.

CHAPTER XXI.

GLAUCOMA AND CAT'S EYE.

SECTION I.—GLAUCOMA.[1]

It is evident that Hippocrates comprehended under the term *glaucoma*, every sort of opacity which appears behind the pupil. Thus, in enumerating the diseases to which man is exposed at different periods of life, he mentions, along with others to which old age is subject, ὀφθαλμῶν καὶ ῥινῶν ὑγρότητες, ἀμβλυωπίαι, γλαυκώσεες, καὶ βαρυηκοΐαι,[2] evidently employing the term γλαυκώσεες to signify rather a class of diseases than any single affection of the transparent parts of the eye. The appearances arising from effusion of lymph into the pupil, or what we now term *spurious* cataract, are no doubt very different from those presented by capsular or lenticular opacity; and these, in their turn, are, in general, readily discriminated from those opacities which seem to be situated still deeper in the eye. We, who have the advantage of knowing, by dissection, the differences of these three kinds of disease which affect the transparent media of the eye, need not be surprised that they were not accurately distinguished by the father of medicine, who, though he did not fail to observe that the κόραι γλαυκούμεναι presented various colours and forms in different cases, that this class of diseases of the eye arose from a variety of causes, and that some of these diseases were more destructive of vision than others,[3] had probably enjoyed no opportunity of ascertaining, after death, the nature of those changes upon which the γλαυκώσεες depend; nor had he the advantage of knowing that some, at least, of these diseases could be removed by operation, and in this way vision be restored.

It is uncertain by whom, or at what period, the term ὑπόχυμα or ὑπόχυσις was first employed to signify a particular species of opacity behind the pupil. That it had, in a great measure, superseded the generic appellation employed by Hippocrates, is evident from the manner in which Celsus introduces this subject to our notice, and from his total omission of γλαύκωμα or γλαύκωσις. "Suffusio quoque, quam Græci ὑπόχυσιν nominant, interdum oculi potentiæ qua cernit, se opponit."[4] *Suffusio*, here, is nothing more than a translation of ὑπόχυσις, and expresses some conjectural and unfounded notion which the Greeks had adopted regarding the nature of cataract. They did not know that this disease is, in general, nothing more than a change in the transparency and colour of a natural part of the eye, namely, the crystalline lens. On the contrary, they had been taught, (probably by Herophilus), that the lens was the immediate organ of vision;[5] and, therefore, they were led to ascribe the disease, which they found to prevent vision till it was removed by surgical operation, to a suffusion merely of some new or morbid substance between the iris and the lens.

Although the diversity of opacities, which occur behind the pupil, had either not attracted the attention of Celsus, or was deemed by him unworthy of notice, or had not been particularly insisted upon by the Greek authors from whom he copied, the later Greeks were well aware that the opacities seen through the pupil were very different in different cases, and that only some of them were susceptible of cure by operation. Those which were generally incurable, they distinguished by the name of γλαυκώματα; while on the more favourable, they bestowed that of ὑπόχυματα. They also came to the conclusion, that the former set of opacities depended on a change of colour and consistence in the crystalline lens, an opinion from which the moderns have erroneously departed; but that the latter were to be attributed to the accumulation of a new substance, suffused between the iris and the crystalline, a notion which the moderns have successfully corrected. Abundant proof could be brought that these were the doctrines of Galen,[6] and even of Rufus;[7] and, if it were necessary, we might trace them through the writings of Oribasius, Aëtius, Paulus, Actuarius, and a crowd of others, down to the time of Brisseau. Even Maître-Jan, to whom we are, in a great measure, indebted for establishing, by dissection, the fact, that cataract is, in general, an opacity of the crystalline lens, and not a filmy suffusion between that body and the iris, still maintained that glaucoma, also, was a disease of the lens—"une alteration toute particuliére du cristallin, par laquelle il se desséche, diminue en volume, change de couleur et perd sa transparence, en conservant sa figure naturelle, et devenant plus solide qu'il ne doit être naturellement."[8]

Preceded by Rolfink, Borel, and others, in the discovery, that the most common kind of cataract has its seat in the crystalline lens, (a discovery, however, which he confirmed by many valuable observations), Brisseau[9] appears to have been the first to announce to the profession

the opinion, which, from that day to this, they have almost universally adopted, that while cataract or ὑπόχυμα was an opacity of the lens, γλαύκωμα was a similar affection of the vitreous humour—an opacity deeply seated in the eye, frequently of a bluish or greenish colour, and visible through the transparent lens. He had been led to this opinion partly from what had been detected on dissecting the eyes of Bourdelot, physician to Louis XIV. who, having been the subject of a disease pronounced to be cataract, left orders that his eyes should be examined after death, in order to throw some light, if possible, on the much agitated question, whether cataract was a film occupying the posterior chamber, or an affection of the crystalline body. The dissection was performed by Maréchal. The lens in the right eye, with which, for many years, the patient had been scarcely able to distinguish light from darkness, was found to be totally opaque; its exterior lamellæ were less solid than the interior, forming, as it were, a whitish membrane of about half a line's thickness, which included a nucleus of more solid consistence, and of a yellowish colour. Immediately behind the fossula, which contained the lens, the vitreous humour was also opaque to the depth of more than a line, and tinged of a yellow colour, although not to the same degree. The left eye, with which Bourdelot had continued to see with tolerable distinctness, had begun to be affected in a similar way; for the lens had already lost much of its natural transparency, and the vitreous humour, in contact with it, was slightly yellow. Brisseau drew the conclusion from this dissection, that, in such cases, the complication of diseases would necessarily render abortive any attempt to restore sight by operation; that although the lens were couched, the opacity of the vitreous humour would still continue, and be sufficient to impede the passage of the rays of light to the retina. He considered himself also justified in claiming for this opacity of the vitreous humour the name of *glaucoma*.[10]

Brisseau, moreover, having demonstrated to his full satisfaction that cataract was an opacity of the lens, was naturally led to the conclusion that the vitreous humour was subject to a similar affection, from the well ascertained fact, that the loss of sight attendant on the disease called glaucoma was incurable by operation, which he thought could not have been the case, had it consisted, as was generally pretended, in a desiccation and change of colour of the lens. He reasoned that had glaucoma resided in the lens, it would have been cured by the operation of depression; but as it was notorious that this operation did not cure the blindness which accompanies glaucoma, he concluded that it was a disease of some other part of the eye. He fixed upon the vitreous humour as its seat; partly vindicated, no doubt, in doing so, by the above mentioned dissection by Maréchal. Brisseau was not aware that the chief cause of the loss of sight in glaucoma resides neither in the lens, nor in the vitreous humour, but in the retina.

The generality of modern authors have adopted, without hesitation, the doctrine that glaucoma is a disease of the vitreous humour.

They speak of it as an opacity of the hyaloid membrane, or of the fluid therein contained, and some of them as an inspissation of the latter.

Mr Wardrop, for instance, states, that "in some cases the vitreous humour acquires a dull-greenish colour, accompanied with insensibility of the retina, a species of amaurosis which has generally been called *glaucoma*."[11]

Fabini says, "Glaucoma obscurationem humoris vitrei et membranæ hyaloideæ exhibet."[12]

"Sæpenumero nimis spissum, tenax et obscurum est hoc corpus vitreum, et jam parit *glaucoma*," says Voit.[13]

Professor Jüngken states[14] glaucoma to be a cloudiness of the vitreous body, caused by exudation, the product of chronic inflammation of the hyaloid membrane. He says that the retina always suffers along with the vitreous body, whence the concomitant appearance of amaurosis with glaucoma. He tells us, that glaucoma is characterized generally by a gray-greenish sea-coloured cloudiness in the bottom of the eye, remote from the pupil, and appearing concave. He notices only one variety of the disease, and never hints at any other seat of the complaint than the vitreous body.

Professor Rosas, in his latest work[15] on the diseases of the eye, distinguishes three kinds of glaucoma, viz. one of the hyaloid, another of the retina, and a third of the choroid. He makes no mention of lenticular glaucoma, which is much more common than any of the three which he particularizes. Indeed, what may be considered as vitreous, retinal, and choroidal glaucomata are very rare diseases.

A distinction has been made between *acute* and *chronic* glaucoma. The chronic variety is by far the most frequent. It is the disease which has generally been known by the name *glaucoma*, and is so apt to be confounded with cataract.

It has been stated at page 483, that glaucoma is sometimes combined with arthritic inflammation. When this is the case, the sclerotica and conjunctiva are loaded with varicose vessels of a livid colour, the pupil is irregularly dilated, and the lens, opaque and greatly thickened, is pushed forward so as almost to touch the cornea; the junction of the sclerotica and cornea is of a pearl-white colour; racking pain is complained of in the eye and head, and vision becomes totally extinct. Such symptoms sometimes occur suddenly, constituting what is termed *acute glaucoma*. After some time, the inflammatory symptoms generally subside, and the contents of the eyeball begin to be absorbed, so that it shrinks to less than its natural size, and, instead of the preternatural hardness, which it formerly presented, becomes boggy. In some cases, the cornea, pressed upon by the hypertrophied lens, ulcerates and gives way, so that the lens is discharged, along with a considerable quantity of blood.[16]

It is to *chronic glaucoma* that I have now to direct the reader's attention.

Symptoms. The appearances presented by the eye affected with chronic lenticular glaucoma, are well calculated to impose upon the observer, and lead him to conclude that he is looking through a transparent lens at an opaque vitreous humour. There is a muddiness, or cloudiness of the humours, but the observer feels a difficulty in deciding what part is affected. The opacity appears to be more deeply seated than the lens; more so, however, in the commencement of the disease than after it has continued for some time. Indeed, in the earliest stage, the greenish reflection, which we designate by the name of glaucoma, appears to come almost from the very bottom of the eye. As the disease advances, the apparent opacity, always of a greenish colour, and often sea-green, is seen as if occupying the centre of the vitreous humour, and at last appears to be immediately behind or in the posterior part of the lens.

Limited and sluggish motion of the pupil, with other amaurotic symptoms, always attends glaucoma. Ultimately the pupil is dilated, and the retina insensible to light. The loss of sight, however, is generally very gradual, and is sometimes attended, at least for a time, by diminution in the size of the pupil.

Hardness of the eye is a constant symptom in the middle stage of glaucoma, and often attends the first and the last stages. This symptom is owing apparently to an excessive secretion of vitreous humour, first of all into the cells of the hyaloid, and after this membrane has been destroyed or absorbed, into the place which it formerly occupied.

The symptoms which we gather from the testimony of the patient, are the following: viz. sensations of fiery and prismatic spectra, muscæ volitantes, misty and indistinct vision, and pain across the forehead, which is at first slight, but often becomes severe. Not unfrequently those affected with glaucoma have long suffered from those pains in the teeth and head, which are generally accounted rheumatic. In some instances the glaucomatous eye is still sensible to objects placed to one or other side of the patient, while in every other direction nothing is distinguished.

Diagnosis. If the pupil of a glaucomatous eye is small, the appearances are apt to impose on the inexperienced observer for those of cataract. The colour, however, of the glaucomatous eye, is sufficient to prove that the case is at any rate not one of simple lenticular cataract. A green cataract is always attended with glaucoma. On dilating the pupil by belladonna, the green appearance presented in simple glaucoma seems to retire to a greater depth behind the iris, and becomes more circumscribed. The other diagnostic symptoms I have fully considered at page 638. I have also explained there the catoptrical signs of the three stages of glaucoma.

There is a traumatic affection of the eye, which bears a strong resemblance to glaucoma.[17] The injuries which cause the affection in question are generally severe; such as, a penetrating wound of the cornea, or a blow with the fist. Iritis comes on, and in a few

days the pupil becomes of a fine sea-green colour. I suspect this state depends on a lymphatic or purulent deposition immediately behind the lens.

Pathological anatomy. It is remarkable how very few and imperfect are the accounts of the dissections of glaucomatous eyes, which have been recorded either before or after the time of Brisseau. The reader will at once perceive how little could properly be concluded from the dissection of Bourdelot's eyes by Maréchal. A single instance, however striking it might be, and well authenticated, could not warrant a general conclusion. It is not even stated, however, that Bourdelot's eyes had ever presented, at any period of his life, the symptoms of glaucoma; so that had not Brisseau been led by arguments of another sort, it is very unlikely that he would have drawn any thing from a fact so insulated and incomplete.

I had long felt anxious to ascertain by dissection, the changes which the eye undergoes in glaucoma, and being favoured, some time ago, with several eyes in this state, I carefully examined them. They were all of them taken from subjects pretty far advanced in life. The following are the particulars which I observed in the greater number of cases.

1. The lens of a yellow, amber, yellowish-red, or reddish-brown colour, especially towards its centre; its consistence firm; and its transparency perfect, or nearly so. In some cases, however, the reddish-brown colour of the central part of the posterior lamellæ was so deep as considerably to impair its transparency. This part was also drier than natural.

2. The vitreous humour in a fluid state; perfectly pellucid; colourless, or slightly yellow. No trace of hyaloid membrane.

3. The choroid coat, and especially the portion of it in contact with the retina, of a light brown colour, with little or no appearance of pigmentum nigrum.

4. In the retina, no trace of limbus luteus, or foramen centrale.

To the first of these changes, namely, the amber or reddish-brown colour of the lens, and especially of its posterior lamellæ, I am inclined chiefly to attribute the peculiar appearance of the deep-seated parts of the eye in glaucoma. Indeed, in some incipient cases, an amber colour of the lens was the only change I could detect on dissection. The glaucomatous lens, viewed in its natural situation, seems of a greenish, sometimes of a deep sea-green, colour. Remove it from the eye, the green appearance is lost, and on being viewed against the light, the lens is found of a deep amber colour. In glaucoma, then, the lens has become, in a certain sense, dichromatic. The lens, and the vitreous humour, which is also often yellowish in glaucoma, probably absorb the violet, blue, and red rays of the light, leaving the yellow and green rays but little affected, whence may result the green appearance of the humours.

It is well known that various substances in nature present a different colour, according as they are seen by reflection or by refraction; and the glaucomatous lens appears to be one of them. Seen

by reflection, it is green; seen by refraction, it is amber, or reddish-brown; exactly as the infusion of *lignum nephriticum*, if held between the light and the eye, appears of a golden or reddish colour, but if held from the light, so that the eye is between the light and the phial, it appears of a blue colour;[18] or as the purpurate of ammonia, when viewed by transmitted light, is of a deep-red colour, while, by reflected light, the two broadest opposite faces of the crystals of that salt appear of a brilliant green.[19]

There is no green surface in the human eye directly to reflect the green rays, as there is in the eye of the sheep. It must, then, be from an absorption of the extreme prismatic rays, as the light passes through the eye, that a greenish reflection is produced; and the part most likely to affect the light in this way is the lens. In confirmation of this, if the lens is extracted, or if it sinks to the bottom of the dissolved vitreous humour, the glaucomatous or green appearance is lost.

The dissolved state of the vitreous humour, which my dissections of glaucomatous eyes lead me to consider as a part of this disease, is always attended, at least in what may be called the middle stage of glaucoma, by a preternatural firmness of the eye to the touch, evidently arising from over-distention of the tunics.

In one case of glaucoma, I observed the lens tremulous. It was not opaque or cataractous. Its tremulousness I detected by the evident motion of a lucid point behind the pupil, changing its situation on every movement of the eye.

The patient with glaucoma sees ill, partly from the retina being unsound, partly from the membrane of the pigment being unable to absorb the rays of light, partly from the light not being freely transmitted by the central dark-coloured portion of the lens; but still he sees, and often continues to do so for many years after the glaucoma has become observable, a sufficient quantity of light for the perception of objects being transmitted through the circumferential portion of the lens.

It not unfrequently happens, after glaucoma has continued for some time, that the surface of the lens becomes opaque or cataractous. I have seen this occur suddenly, and in other cases slowly. As the nutrient vessels of the posterior hemisphere of the capsule are derived from the arteria centralis humoris vitrei, it is not surprising that the destruction of the hyaloid membrane should be followed by opacity of the lens. If an attempt be made to operate on such a cataract with the needle, it is apt to sink unexpectedly to the bottom of the vitreous humour; if by extraction, the same event sometimes takes place, so as to frustrate the object of the operation, and the eye is drained by the loss of dissolved vitreous humour. Even when extraction is conducted with great caution, or performed, perhaps, through a small section of the cornea, a large quantity of this fluid is apt to be evacuated.

The opaque lens, left to itself, may remain for many years *in situ*, notwithstanding the dissolved state of the vitreous humour, the zona

ciliaris still preserving its adhesion to the ciliary processes; at length, however, this adhesion may be destroyed, when the opaque lens will suddenly sink to the bottom of the eye, as in the case already quoted (page 723) from Mayerne.

Proximate cause. Respecting the cause of the alteration in the lens, we can say nothing. Inflammation may, perhaps, be the cause which leads to the destruction of the hyaloid membrane, which, in its turn, is likely to produce a series of other local changes. It is probable that the aqueous fluid, which fills the place of the vitreous humour, becoming superabundant, promotes, by pressure, the absorption of the pigmentum nigrum, and at last renders the retina insensible.

Although it can scarcely be doubted, that the membrane of the pigment exercises but a subsidiary part in the production of vision, yet it is evident, that without the aid of the pigmentum nigrum, it is impossible for a due impression to be produced upon the retina. The fact that the eye of the albino, in which the membrane of the pigment is congenitally destitute of colouring matter, is unable to discern objects with distinctness in the ordinary light of day, is sufficient to prove the necessity of a healthy condition of that membrane for a due performance of the function of vision.

Exciting and Predisposing Causes. The Germans appear to consider glaucoma as almost always connected with arthritis, or rather as the result of slow arthritic inflammation of the eye.

Glaucoma is much more frequently met with in old than in young subjects; rarely occurring before the age of 40 years, but frequently after 60. Indeed, so common is glaucoma in those far advanced in life, that we may almost regard it as part of the changes coincident with old age.

I have been often led to suspect that the habitual use of spirits and tobacco operates powerfully in the production of glaucoma. This disease also appears to be more apt to occur in those who have been scrofulous in childhood, or who have exerted their eyes much on minute objects, or such as reflect white light. Yet, even taking these facts into consideration, it is not easy satisfactorily to explain the frequency of glaucoma in some countries, and in certain classes of society, and its rarity in others. Thus, Benedict tells us, that one half of the glaucomatous patients, whom he had seen during 12 years' practice in Breslaw, were Jews, among whom he states glaucoma to be extremely common.[20] Scarpa, on the other hand, has not thought it necessary to introduce the subject of glaucoma into his treatise on the diseases of the eye. It is also remarkable that, in one of his letters to Maunoir, he mentions, that during the long series of years in which he filled the anatomical chair at Pavia, he had never, in dissection, met with dissolution of the vitreous humour, and that after reading Sir William Adams' work, published in 1817, he made at least 40 eyes be examined, of persons who had died between 60 and 80 years of age, without finding the vitreous humour either wholly or partially dissolved in one of them. I am certain that several out of any 40 persons, above 60, in this part of

the country, would be found more or less glaucomatous, with the vitreous humour fluid, and the pigmentum nigrum gone.

Prognosis. When glaucoma has commenced in one eye, it generally extends also to the other. We often see the disease in different stages in the two eyes.

In its fully formed stage, glaucoma is absolutely incurable; but remedies may occasionally arrest the progress of the disease, and even improve the impaired vision.

Treatment. 1. On the presumption that glaucoma originates in an inflammatory affection of the hyaloid membrane, bleeding and purging have been employed for its cure, and occasionally this practice has been attended with benefit. Counter-irritation, also, has been found useful, especially the tartar emetic eruption between the shoulders.

2. Calomel, with opium, has been given, on the principle that in almost all cases of deep-seated inflammation of the eye, mercury proves salutary. As is the case in arthritic ophthalmia, with which glaucoma is certainly allied, an alterative course will prove more beneficial than if the mercury were pushed so as severely to affect the mouth. Indeed, it is evident that from the age and constitution of those who are in general the subjects of glaucoma, neither depletion nor mercurialization can, with propriety, be employed, without more than ordinary caution.

3. Rest of the eyes, a mild diet, a healthy state of the skin, and abstinence from alcoholic fluids, and tobacco in every form, must be enjoined.

4. Arthritic inflammation of the eye is often greatly benefitted by the use of tonics; as precipitated carbonate of iron, sulphate of quina, and the like. After depletion, such remedies may be also tried in glaucoma.

5. Dilatation of the pupil by belladonna greatly improves the vision of most glaucomatous eyes, and may be employed day after day as a palliative. The most convenient mode of applying the belladonna is in aqueous solution, filtered through paper, and dropped upon the conjunctiva morning and evening. Some, however, find their sight dazzled, and a new degree of mistiness produced, by belladonna, which, of course, we should never think of continuing, if followed by such effects.

6. As a superabundance of dissolved vitreous humour appears to form an essential part of the morbid changes observed in the glaucomatous eye, it is not unreasonable to conclude that occasionally puncturing the sclerotica and choroid might prove serviceable, by relieving the pressure of the accumulated fluid on the retina. The puncture should be made with a broad iris-knife at the usual place of entering the needle in the operation of couching. The instrument should be pushed towards the centre of the vitreous humour, turned a little on its axis, and held for a minute or two in the same position, so that the fluid may be allowed to escape.

7. The removal of the crystalline lens from a glaucomatous eye

removes the greenish appearance of the humours, and sometimes improves the vision of the patient. At the same time, although I am persuaded that the absence of the lens might be advantageous even in the early stage, and prevent, in a considerable measure, the further progress of the amaurosis which accompanies glaucoma, extraction is an operation, which I would, by no means, venture to recommend, for general adoption. The patient generally sees too much to warrant our exposing him to the danger of arthritic inflammation coming on after the operation. I have known glaucoma operated on for cataract; that is to say, the amber-coloured lens removed by extraction, the operator apprehending that he was removing an opaque or cataractous lens; and I have seen the incision, after such an operation, heal without inflammation, and the patient receive a considerable accession of vision. But I have also known such violent inflammation follow the removal of the lens from a glaucomatous eye, as entirely destroyed the natural structure of the most important parts of the organ. There is reason to suspect that lenticular glaucoma has often been operated on with the needle, the disease being mistaken for cataract; and that the general result of couching or of division was fatal to vision.

That the early removal of the lens might prove a means of preventing glaucoma, and not merely the lenticular, but the retinal part of the disease, is a conclusion to which I was naturally led by the following case:—

Case 277.—R. C. aged 48 years, applied to me in March 1820, in consequence of impaired vision of the left eye, which already presented a glaucomatous appearance. In his right eye, there was a capsular cataract, the result of an injury 40 years before, which had been followed by absorption of the crystalline lens. The vision of the left eye rapidly declining, while evident perception of light and shade was still retained by the right, I opened the cornea of this eye, and drew the capsule out of the pupil, and partially between the lips of the incision of the cornea, leaving it to adhere there, and thus securing a passage for the rays of light into the interior of the eye. As good vision was restored by this means as generally follows an operation for cataract, and the patient was able, with the assistance of the right eye and a cataract-glass, to follow his usual employment for some years. The vision of the left eye became still more impaired, under signs which appeared to me indubitably those of glaucoma and amaurosis. The patient, however, was persuaded that he had a cataract in this eye, and urged me to operate on it. This I declined; but I recommended the patient, since he still had doubts about the matter, to consult the late Dr Monteath. He did so, and felt greatly disappointed, when Dr M. only confirmed the opinion which I had previously given him. Not yet satisfied, he went to Edinburgh, where he unfortunately met with encouragement in the notion of his eye being affected with cataract, and accordingly underwent an operation, which was followed only by violent and destructive inflammation.

It struck me, in reflecting on this case, that the total absence of glaucoma in the right eye was owing to the lens having been absorbed at an early period of life; for glaucoma is a disease, which, under ordinary circumstances, very rarely, if ever, attacks the one eye without speedily affecting the other also. The absence of the lens may have operated also in preventing the disease of the hyaloid membrane, which ends in its destruction, and to which I feel inclined, so far as our present evidence goes, to attribute in a great measure, the affection of the retina which attends glaucoma.

[1] Γλαύκωμα and γλαύκωσις, from γλαυκὸς, *blue, green*, or *grey*; because of the bluish, greenish, or greyish appearance of the pupil.

[2] Aphorismorum Sec. iii. 31.

[3] 'Αἱ δὲ κόραι γλαυκούμεναι, ἢ ἀργυροειδέες γινόμεναι, ἢ κυάνεαι, οὐδὲν χρηστὸν. τουτέων δὲ ὀλίγαι ἀμείνους, ὁκόσαι ἢ σμικρότεραι φαίνονται, ἢ ἐυρύτεραι, ἢ γωνίας ἔχουσαι, ἔιτ' ἐκ προφασίων τοιαύται γινοίατο, ἔιτ' αὐτόμαται.' Prædictionum Lib. ii. 28.

[4] De Re Medica; Lib. vi. cap. iii. sect. 2.

[5] 'Sub his gutta humoris est, ovi albo similis, à quâ videndi facultas proficiscitur: 'κρυσταλλοειδὴς à Græcis nominatur.' Ibid; Lib. vii; pars ii. cap. i; sect. ii.

[6] 'Καὶ γὰρ καὶ ταῦτ' ἴρηται πρόσθεν, καὶ ὡς ἀυτὸ τὸ κρυσταλλοειδὲς ὑγρὸν, τὸ πρῶτον 'ἐστὶν ὄργανον τῆς ὄψιος. τετμημένοι δὲ ἐναργῶς τὰ καλούμενα, πρὸς τῶν ἰατρῶν ὑποχύματα, 'μέσα μὲν ἑστάμενα τοῦ κρυσταλλοειδοῦς ὑγροῦ, καὶ τοῦ κηρατοειδοῦς χιτῶνος. * * '——— καὶ ὡς τὸ πάθημα, τὸ πρὸς τῶν ἰατρῶν ὀνομαζόμενον γλαύκωσις, ξηρότης μέν ἐστι, καὶ πῆξις ἄμετρος τοῦ κρυσταλλοειδοῦς ὑγροῦ.' Galenus de Usu Partium; Lib. ix. Opera, vol. i. p. 473; Basileæ, 1538.

[7] Quoting from Rufus, Oribasius observes, 'Glaucoma et suffusionem veteres 'unum eundemque morbum esse existimarunt: posteriores verò glaucomata 'humoris glacialis, qui ex proprio colore in glaucum convertatur, et mutetur, 'morbum esse putaverunt: suffusionem verò esse effusionem humorum inter 'uveam et crystalloidem tunicam concrescentium: cæterùm glaucomata omnia 'curationem non recipiunt: suffusiones verò recipiunt, sed non omnes.' Oribasii Synopseos Lib. vii. Cap. 47; Rasario interprete; Basileæ, 1557.

[8] Traité des Maladies de l'Œil, p. 223; Troyes, 1711.

[9] Traité de la Cataracte et du Glaucoma; Paris, 1709.

[10] Heister de Cataracta, Glaucomate, et Amaurosi, p. 46; Altorfi, 1713.

[11] Essays on the Morbid Anatomy of the Human Eye, Vol. ii. p. 127; London, 1818.

[12] Doctrina de Morbis Oculorum, § 460; Pesthini, 1831.

[13] Commentatio exhibens Oculi Humani Anatomiam et Pathologiam, p. 40; Norimbergæ, 1810.

[14] Lehre von den Augenkrankheiten, p. 565; Berlin, 1836.

[15] Lehre von den Augenkrankheiten, p. 326; Wien, 1834.

[16] See Case by Houttuyn, Histoire de l'Académie Royale des Sciences, pour 1769, première partie, p. 86; Paris, 1777.

[17] Ammon's Zeitschrift für die Ophthalmologie, Vol. v. p. 62; Heidelberg, 1835.

[18] Boyle's Experiments and Considerations touching Colours, pp. 199, 216; London, 1670.

[19] Philosophical Transactions for 1818, p. 423.

[20] Handbuch der praktischen Augenheilkunde; Vol. v. 146; Leipzig, 1825.

SECTION II.—CAT'S EYE.

There can be little doubt, that under the appellation of *cat's eye*, several diseased states have been confounded, differing entirely in their nature and seat, and agreeing only in an opalescent appearance of the pupil, or of the bottom of the eye, these parts reflecting the light in various colours, or at least with various degrees of intensity, according to the direction in which the eye is turned. This appearance Beer[1] compared to the reflection from the eye of a cat in the dark.

1. What Beer calls amaurotic cat's eye, occurring in children, after injuries of the eye, is nothing else than what has been already described (page 605) as a non-malignant deposition or tumour occupying the place of the vitreous humour.

2. The affection in old people, which he includes in the same description, and which presents a peculiar reflection, often of a silvery appearance, from the bottom of the eye, is different.[2] I have seen this sort of cat's eye both in eyes which retained vision, and in amaurotic eyes. The reflection generally came from one side of the eye, and seemed to be as deep as the retina. The patients, in all the cases I have seen, were far advanced in life. What is the cause of the reflection is unknown, but it cannot be a mere deficiency of pigmentum nigrum.

3. There is another state of the eye, in which the reflected and varying light seems to come from the front of the crystalline capsule, and presents a close resemblance to the reflection from a piece of opal, a mineral popularly called cat's eye. In the cases in question, when we view the eye directly in front, the appearance is merely that of a brownish opacity; but whenever the patient looks upwards, the opalescence becomes very striking, presenting almost a glittering or silvery reflection.

The nature of this disease, which is plainly quite different from those already noticed, has never been determined by dissection.

In one case, in which both eyes were affected, and a mere perception of light and shade was retained, I ventured, at the patient's request, to open one of the corneæ, and introduce a cataract needle through the pupil. I felt nothing like the resistance of the lens, a profuse discharge of aqueous fluid took place, the cornea healed, and the opalescent appearance continued almost exactly the same as before the operation.

In another instance, in which this kind of cat's eye was very distinct, the patient read with facility by the help of glasses, and presented no signs of amaurosis.

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[1] Lehre von den Augenkrankheiten, Vol. ii. p. 495; Wien, 1817.

[2] This variety of cat's eye is represented by Ammon, in his Klinische Darstellungen der Krankheiten des menschlichen Auges, Vol. i. Pl. 15. Fig. 10, 11.

CHAPTER XXII.

VARIOUS STATES OF DEFECTIVE OR UNNATURAL VISION.

SECTION I.—MYOPIA,[1] OR NEAR-SIGHTEDNESS; OVER-REFRACTION.

THERE is a certain distance from the eye, called *the point of distinct vision*, at which objects are perceived better than at any other dis-

tance. This point, however, is different in different individuals, or even in the two eyes of the same person. It averages from about fifteen to twenty inches. The shortest distance at which objects can be seen with any ordinary degree of distinctness by common eyes, is about seven or eight inches. But some eyes can discern no object distinctly unless it be brought nearer than the ordinary distance for distinct vision, or even within the distance of seven inches, while others require the object to be removed farther away than the average point of distinct vision. Eyes affected in the former manner are said to be *myopic;* in the latter manner, *presbyopic.*

These two classes of defective eyes are generally regarded as dependent upon some peculiarity in the transparent media of the organ. In the myopic eye it is supposed that the rays of light must either be refracted too much, so that they converge into foci anteriorly to the retina, or that the axis of the eye must be longer than natural, so that the retina is too far back, and does not receive that perfect impression which is necessary for distinct vision. The reverse of this is supposed to have place in the presbyopic eye. Either its axis is too short, or its refractive powers too feeble, so that the rays of light proceeding from objects and entering the eye, tend to collect into foci, not upon the retina as they ought to do, but behind it. It is only, however, by that degree of refraction, or with that form of the eye, which permits the rays of light, proceeding from the luminous points of objects, to be brought into corresponding or nearly corresponding focal points upon the retina, that perfect vision can be produced. Falling either before the retina, or tending to fall behind it, the image will necessarily be diluted, and the impression obtuse. To remedy these defects, the person affected with myopia brings the object within that distance, which will ensure the image being thrown so far back as to fall upon the retina, while the presbyopic person, by removing the object to a certain distance from his eye, brings the image forwards to the same point.

Symptoms of Myopia. 1. *Objective symptoms.* The eyes of those who are short-sighted are frequently prominent, and the cornea preternaturally convex ; there is an evident approach to the state of hydrophthalmia, the space called anterior chamber being more than commonly deep ; the pupil is generally large, the eyeball firm, the eyelids often tender.

2. *Subjective symptoms.* As the myopic eye has its point of distinct vision as well as the perfect eye, those affected with the greatest degree of near-sightedness bring every object, which they wish to see clearly and distinctly, to the distance of two or three inches, or even as close as one inch from the eye, while other myopic persons are able to enjoy as good vision although the object is at six or nine inches' distance. The eye which perceives nothing distinctly beyond ten inches may be considered myopic. This imperfection, then, cannot be concealed, if the individual affected with it attempts to read, or to examine any small object minutely. If we direct his attention to objects at any considerable distance, it is evident that

they either make no impression on his retina, or one which is exceedingly indefinite and obscure. He cannot distinguish the countenances of the performers on the stage, nor the subject of pictures placed a few feet above his head; he cannot read the inscriptions on doors and houses, nor recognise persons across the street; if he go into a large room, in which there are many persons, he cannot readily distinguish those he knows.

It is remarked of those who are short-sighted that they do not look at the person with whom they converse, because they cannot see the motion of his eyes and features, and therefore they are attentive to his words only; that in reading, they hold the book obliquely towards their eyes, this helping them to see it distinctly, either by allowing the light to illuminate it better, or by bringing its image upon the lateral part of the retina; that they see more distinctly and somewhat farther off by a strong light than a weak one, on account of the contraction of the pupil which is thereby produced, and which serves to exclude all but the more direct rays of light, and consequently to lessen the apparent confusion; that on the same principle, when they endeavour to see any distant object distinctly, they almost close their eyelids, and that through a pin-hole in a card, objects appear to them much clearer and better defined, than with the naked eye.

Short-sighted persons write a small cramp hand, and prefer to read a small type, the enlargement of the visual angles by the proximity of the object, enabling them to do so.

They commonly see better in an obscure light than those whose sight is good, on account of the largeness of the pupil. The short-sighted person sees without effort near objects, whereas those who have ordinary sight contract the eyelids, and the pupil, to obtain the same effect. They consequently receive much less light in a medium degree of illumination, and when the eye is directed to near objects, than do persons naturally short-sighted.

Short-sighted persons generally attribute to distant objects a greater magnitude than do those who have a good common sight. The reason is, that while distinct images are formed in the perfect eye only at the intersection of the rays of light issuing from the object, the short-sighted eye receives on the retina all those rays beyond their intersection, and consequently at a point where they are more extended.

The sight of one who is myopic is much improved by his looking through a small hole, such as that made by a pin in a card. A myopic eye sees near objects distinctly, because the foci of the refracted rays are at the retina. Distant objects are seen indistinctly, because the retina being behind the foci, the image of each point is expanded on the retina, in the form of a circular halo; and as the images of adjacent points overlap, indistinct vision is a necessary consequence. The area of the halo formed by each point depends on the diameter of the pupil; being greater, the greater that diameter. Hence it obviously follows that by diminishing the

aperture through which the light is admitted, the halo will be less extensive, and the images of the adjacent points more distinct, or, in other words, vision will be clearer.

If a short-sighted person looks at a candle placed a yard or two off, it appears dim, and seems doubled, tripled or quadrupled. This multiplication of the images by the myopic eye, in viewing distant objects, has not been satisfactorily explained. The same multiplied images are seen by ordinary eyes, when the eye, in viewing a distant object, is by a voluntary effort adapted for vision at a shorter distance. When a person with ordinary sight adapts his eye for vision at 10 inches, and looks at a candle at the distance of six feet, it presents the appearance of several images partially overlapping each other, whereas from theory one ill-defined and slightly enlarged image would be expected.

It is a question which naturally occurs to one who first turns his attention to the nature of myopia, whether this disease consists merely in over-refraction, or involves also a deficiency in the accommodating power of the eye to different distances. Dr Smith, no mean authority on such a subject, is of opinion that the power of varying the quantity of refraction is still retained by the myopic eye. "If short-sighted persons" says he, "can read a small print distinctly at two different distances, whereof the larger is but double the lesser, which I believe most of them can do; it follows that as great alterations of figures are made in their eyes as in perfect eyes, that can see distinctly at all intermediate distances between infinity and the larger of those two. And this is the reason that a short-sighted person can see distinctly at all distances with one single concave of a proper figure; which otherwise must have been differently figured for different distances. It follows, then, that the cause of short-sightedness is not a want of power to vary the figure of the eye, and the quantity of refractions; but that this whole quantity is always too great for the distance of the retina from the cornea."[2]

It is rarely the case that the two eyes even of the same person correspond in refractive power. The left partaking perhaps in the tendency to debility and disease, which so frequently attaches itself to the left side of the body, is often found to be somewhat short-sighted. Few are aware of the disparity which often exists between their eyes, until some accidental circumstance leads them to make a comparative trial of the two; and it is by no means uncommon to meet with individuals, who, on making the experiment, have discovered that one eye was greatly defective, or even entirely blind. Mr Wardrop remarks[3] that it will generally be found, that not only the right is more perfect than the left eye, but that when a person is apparently looking at an object with both eyes, generally only one of them, and that the right one, is actually directed to the object. But this will depend entirely on whether the right or the left is the better of the two. To ascertain the fact, let a spot, at the distance of a few yards from the observer, be covered with the point of one of his fingers, while he endeavours to look at it with both eyes. If

the short-sighted eye, which we may suppose to be the left, be now closed, the point of the finger will continue to appear to cover the spot, and to preserve the same relative situation to it as when both eyes were open; but if the right eye be closed and the left opened, then the relative situation of the point of the finger and spot will appear altered, the spot being uncovered; proving, that in directing the finger to cover the spot, the right eye had alone been employed. Mr Wardrop has met with myopia more frequently in the left eye than the right; Mr Ware, on the other hand, observes that most of the near-sighted persons with whom he has conversed, had the right more affected than the left, and he thinks it not improbable that the difference had arisen from the habit of using a single concave hand-glass, which, being commonly applied to the right eye, contributes to render it more short-sighted than the other.[4]

Efficient causes. Myopia has been attributed to a variety of efficient causes, several of which may coexist.

1. *Too great convexity of the cornea.* As it is before the rays of light reach the crystalline lens that they undergo their greatest degree of refraction, it is evident that a preternaturally convex cornea will produce a convergence so rapid, that the foci will fall very considerably short of the retina. While it is undeniable, however, that in aggravated instances of myopia, the cornea, natural in diameter, may be observed to project considerably above its average altitude, it is also certain that this conformation is by no means a common, nor even a frequent attendant on this disease. When it does occur, it is generally accompanied by a superabundant quantity of aqueous humour, and occasionally by a degree of pressure backwards on the iris, so that this membrane, instead of being plane, becomes concave on its anterior surface.

2. *Too great thickness of the cornea* will undoubtedly tend to bring the rays of light to a focus sooner than they ought to be brought; but it is not at all likely that the cornea is ever of such extraordinary thickness in the adult eye, as of itself to be the cause of myopia. At birth, indeed, the cornea is very thick in proportion to the size of the eye; and to this Petit has ascribed in part, the indistinctness of vision in very young children.[5]

3. *Too great convexity of the crystalline lens* will assuredly produce short-sightedness, whether the over-convexity be on one only, or on both sides of that body. Such conformation has been regarded as probably one of the most frequent causes of myopia; and notwithstanding the testimony of Percy and Reveillé-Parise,[6] that on examining the lenses taken from the eyes of a number of persons, who during life had been short-sighted, they were unable to detect any excessive convexity, we must still admit not merely the possibility of this cause, but the likelihood of its frequent existence.

I have already mentioned the disparity of the eyes of most individuals. I cannot but think that this often depends on different degrees of refractive power in the crystalline lenses, and the opinion is corroborated by what is stated by Meckel, that the crystalline

lenses of the two eyes of the same person have sometimes a very different form.[7]

4. *Preternatural density of any or all of the transparent media of the eye* is also a cause, which will infallibly produce myopia, and which is not unlikely to occur. I have generally observed that myopic eyes are considerably firmer to the touch, than natural, even at an early period of life.

5. *Preternatural elongation of the eyeball*, so that the distance between the cornea and retina is increased, will necessarily occasion myopia, and has even been regarded by some as the only admissible cause of the disease. Such conformation of the eye has been supposed to be sometimes congenital, and in other cases to be acquired from frequent exercise of the sight upon minute objects.

6. *The dilated state of the pupil*, which almost always accompanies myopia, has been generally set down amongst the causes of this disease, whereas it is much more probably an effect. When the sight is perfect, and still more when it is presbyopic, the pupil will have frequent occasion to contract, in aiding the person to see near objects more distinctly, and thus an habitual degree of myosis may be produced; but in those who are short-sighted this will not happen, for to them near objects appear distinct, and therefore not having occasion to contract the pupil for seeing such objects more distinctly, this aperture probably maintains an habitual state of dilatation.

Subjects of myopia. 1. *Age.* Young people seldom discover that they are remarkably near-sighted, until about the age of puberty, or when they begin to use their eyes in earnest. Many persons reach the age of 30 or 40 years, who have no notion that they are near-sighted, until they happen accidentally to look through the concave glasses of some other individual, when they are surprised and delighted to find that they perceive remote objects with a clearness and sharpness of outline, to which they had formerly been altogether strangers. They may have suspected that they did not see across the street or at the theatre, quite so plainly as other people, but as they could read a small print as well as any body, they had no idea that they were the subjects of any defect in their eyes, or that they could improve their vision by any kind of glass.

Although near-sightedness is in general gradual in its progress, manifesting itself about the period of puberty, and increasing from that period up to 20 or 25 years of age, yet instances occasionally occur of its existence even in children, or of its suddenly affecting the eye of a grown up person, who had previously seen distinctly at the ordinary distance.[8] In the cases of children we should examine the appearances presented through the pupil, for very often a central cataract (see page 651) will be found to exist under such circumstances; while the sudden accession of myopia in those who had previously seen well, should lead us to suspect conical cornea, dropsy of the aqueous humour, or some affection of the brain.

It has been very generally asserted that near-sighted eyes are by

age rendered fitter for perceiving distant objects than they were in youth. This opinion appears to have been built on the following false analogy; *viz.* that if those who possess ordinary vision when young, become from the flatness of the cornea or other changes in the structure of the eye, far-sighted as they approach to old age, which is a well established fact, then, the short-sighted must, from similar changes, become better fitted to see distant objects. Short-sightedness tends generally to increase rather than to diminish, as age advances; and should it be joined by glaucoma, the person is obliged to bring any object, which he wishes to see distinctly, within a very short distance of the eye.

2. *Rank and Occupation.* Myopia is much more common in the higher than in the lower ranks of life, and among those who occupy themselves with the close examination of minute objects than in those who scarcely ever attempt to read, write, or apply themselves to any similar pursuit. Mr Ware remarks, that among persons in the inferior stations of society, artificial means are rarely resorted to for correcting slight defects of this nature; and that there is even reason to believe, that in such people, near-sightedness is not unfrequently overcome by the increased exertions that are made by the eye to distinguish distant objects. When persons in the higher ranks, on the other hand, discover that their discernment of distant objects is less quick or less correct than that of others, though the difference may be very slight, influenced perhaps by fashion more than by necessity, they immediately have recourse to a concave glass; the natural consequence of which is, that their myopia in a short time becomes so confirmed, that the recovery of distant vision is difficult, if not impossible.

With regard to the proportion of near-sighted persons in the different ranks of society, Mr Ware endeavoured to obtain satisfactory information, by making inquiry in those places where a large number of individuals of nearly the same station are associated together. He inquired, for instance, of the surgeons of the three regiments of foot-guards, consisting of nearly 10,000 men; and he was informed that near-sightedness was almost unknown amongst them, not six individuals having been discharged, nor six recruits rejected, on account of this imperfection, in the space of nearly 20 years. At the Military School at Chelsea, where there were 1300 children, the complaint of near-sightedness had never been made among them, until Mr Ware mentioned it, and then only three were found who experienced the least inconvenience from it. He pursued his inquiries at several of the colleges in Oxford and Cambridge, and found near-sightedness very prevalent in these institutions. In one college in Oxford, where the society consisted of 127 members, 32 either wore spectacles or used hand-glasses. It is not improbable, that some of these were induced to do so, solely because the practice was fashionable; but Mr Ware believes the number of such to have been inconsiderable, compared with that of those whose sight received some small assistance from glasses, although this

assistance could have been dispensed with, without inconvenience, if the practice had not been introduced.[9]

General Treatment. It is but rarely the case that the medical practitioner has an opportunity of advising those in whom myopia is not yet confirmed, to that course of treatment which might remove the incipient symptoms of this very serious imperfection of sight. If it be correct, that this disease, in by far the greater number of instances, is induced by too much exercise of the eyes upon minute objects, as in reading, writing, sewing, miniature painting, engraving, and the like, the cure would probably be found in abstaining entirely for a time from such occupations, refraining also from the use of concave glasses, and employing the eyes chiefly upon large and distant objects. Haller recommends looking through a small aperture, as a remedy for myopia; but probably this, as well as gradually removing the book from the eye till it can be read at the ordinary distance, reading through convex glasses, and other attempts of a similar sort, will prove of little use, in comparison of the good effects to be derived from frequent exercise out of doors, walking and riding into the country, and travelling through new and interesting scenes.

If, instead of such a plan of treatment, recourse be had to the employment of concave glasses, and the frequent and long-continued observation of near objects be persisted in, the disease becomes not only confirmed, but sometimes greatly aggravated.

"When I first learned to read, at the usual age of four or five years," says Sir Charles Blagden, "I could see most distinctly, across a wide church, the contents of a table on which the Lord's Prayer, and the Belief, were painted in suitably large letters. In a few years, that is, about the ninth or tenth of my age, being much addicted to books, I could no longer read what was painted on this table; but the degree of near-sightedness was then so small, that I found a watch-glass, though as a meniscus[10] it made the rays diverge very little, sufficient to enable me to read the table as before. In a year or two more, the watch-glass would no longer serve my purpose; but being dissuaded from the use of a common concave glass, as likely to injure my sight, I suffered the inconvenience of a small degree of myopy till I was more than thirty years of age. That inconvenience, however, gradually though slowly increasing all the time, at length became so grievous, that at two or three and thirty, I determined to try a concave glass; and then found, that the numbers two and three were to me in the relation so well described by Mr Ware; that is, I could see distant objects tolerably well with the former number, but still more accurately with the latter. After contenting myself a little time with No. 2, I laid it wholly aside for No. 3; and, in the course of a few more years, came to No. 5, at which point my eye has now been stationary between fifteen and twenty years. An earlier use of concave glasses would probably have made me more near-sighted, or would have brought on my present degree of myopy at an earlier period of life. If my

friends had persuaded me to read and write with the book or paper always as far from my eyes as I could see; or if I had occasionally intermitted study, and taken to field sports, or any employment which would have obliged me to look much at distant objects, it is very probable that I might not have been near-sighted at all."[11]

Concave glasses. When once a near-sighted person has experienced the pleasure of seeing remote objects, with that distinctness and comparative brilliancy, which the aid of concave glasses affords, it is not easy to persuade him to renounce their use. Their effect, as is now universally known, is merely to diverge the rays of light before they enter the eye, by this means counteracting the over-refractive power of that organ, and bringing the rays of light exactly into foci upon the retina. The assistance afforded by concave glasses to one set of defective eyes, and by convex to another, had been the subject of admiration and perplexity for several hundred years, till Kepler, in his *Ad Vitellionem Paralipomena*, published in 1604, cleared up the mystery, by explaining, for the first time, the true mechanism of the eye. It had been proposed as a question to Kepler, by his patron, Dietrickstein, in what manner spectacles assisted sight. The first answer he gave was, that convex glasses were of use, by making objects appear larger. But his patron observed, that if objects were by them rendered more distinct, because larger, no person would be benefited by concave glasses, since these diminished objects. The striking resemblance between experiments with the camera obscura and the manner in which vision is performed in the eye, had been pointed out by Baptista Porta, who compared the pupil to the hole in the window-shutter, but fell into the mistake of supposing that it was in the centre of the eyeball that vision was effected.[12] Kepler, in his work above referred to, showed that the office of receiving the images of external objects is performed by the retina, and gave the first clear explanation, of the effects of lenses, whether within or without the eye, in making the rays of a pencil of light converge or diverge. He now explained, that convex glasses assist the sight of presbyopic persons, by so altering the directions of rays diverging from a near object, that they should afterwards fall upon the eye, as if they had proceeded from a more remote one, and that concave glasses benefit the myopic, by producing a contrary effect upon rays which diverge from a distant object—a theory to which no addition has been made by any succeeding author.

The glasses commonly employed for the assistance of myopic eyes are double-concaves, of equal concavity on each side. Occasionally, however, the two sides are made of unequal depth. A plano-concave glass might answer; and in the use of concavo-convexes, (the exterior surface of the glass, or that which is turned from the eye, being convex, and having a less degree of curvature than the interior, or that which is turned towards the eye, which is concave,) there is supposed to be a considerable advantage, in so far as they allow the eyes a greater degree of latitude in vision, without fatigue,

whence the name *periscopic* glasses, under which they were recommended by Dr Wollaston.

Myopic persons are extremely apt to adopt the use of a single eye-glass, against which we ought to put them on their guard. Spectacles are always preferable, because by keeping both eyes in action, not only is vision rendered brighter and easier, but the labour of each eye is considerably lessened. Dr Wells has pointed out another reason, why glasses should be employed rather in the form of spectacles, than singly, which, though it applies more strongly to the use of convex than of concave glasses, I shall here introduce in his own words.

"In regard to such spectacles as I have tried upon myself, I have always found, that, when I looked with them at objects, placed at moderate distances before me, my optic axis passed through the glasses, more inwardly than their centres. With respect, therefore, to spectacles for long-sighted people, as the inner halves of their glasses may be regarded as two prisms, whose refracting angles face each other, to have allowed both my eyes to receive through them pencils of rays from the same point of an object, the intervals of my pupils must have been less than was necessary for that purpose in naked vision. The consequence of which would be, an increase of the refractive power of my eyes. Again; as the like parts of glasses in spectacles for short-sighted persons, may be esteemed to be two prisms, the refracting angles of which are turned from each other, the interval of the pupils must have been increased, and the refracting power of my eyes by this means diminished, when I looked at an object through them, which was directly before me. And effects similar to what I have mentioned, must have followed my viewing objects placed obliquely, through glasses of both kinds. Here then is one advantage, which persons who see with both eyes, either do or may enjoy from spectacles, but which they cannot derive from using single glasses. For if they are presbytic, they can see an object by the means of them with a higher refractive state of the eyes, than if the optic axes met there, as in naked vision; and if myopic, with a less. It is also worthy of remark, that this advantage does not ultimately tend to increase the evil, which first gives occasion for spectacles. On the contrary, if what every writer upon vision asserts be true, that we are apt to become short or long-sighted, according as we are much accustomed to view near or distant objects, it must serve to diminish that evil. In support of this opinion, I shall mention a fact, with which I have been made acquainted by Mr George Adams, of this place, who is not only well skilled in the theory of vision, but, from his situation, as an artist, has better opportunities than most persons, of learning such matters. The fact is this, that he does not know a short-sighted person, who has had occasion to increase the depth of his glasses, if he began to use them in the form of spectacles; whereas, he can recollect several instances, where those have been obliged to change their concave

glasses repeatedly, for others of higher powers, who had been accustomed to apply them to one eye only."[13]

Double-concave glasses are numbered 1, 2, 3, &c. beginning with the longest focus, or shallowest concavity.[14] We must recommend to the near-sighted person to be content with the shallowest glass or lowest number, which answers his purpose. If No. 1 enables him to discern distinctly the names on the corners of the streets, and gives a decided outline to objects whose distance does not exceed about 40 feet, he ought not to have recourse to No. 2. Objects should appear clear through the glass which is chosen; but if it makes them less than natural, or gives them a dazzling or glaring appearance, or if the eye feels strained or fatigued after looking through it for a short time, it is too deep, and a lower number should be selected.

When a near-sighted person wishes to be fitted with concave glasses, the simplest and surest plan is to try a series of them, at an optician's shop. It may happen, however, that an individual in the country is desirous of writing to town for concave glasses, and wishes to mention the focus which will be likely to suit his eye. This may be ascertained by means of the optometer, as improved by Dr Young; but as this instrument is not always at hand, the following rules may be adopted.

1. If the near-sighted person is desirous of assistance in seeing remote objects, *i. e.* beyond 200 or 300 yards, the focal distance of the glasses which he will require for that purpose, should be the distance at which a small object appears distinct to his naked eye. For example, if he reads this type at 12 inches' distance, 12 inches will be the focus of the concave glasses which he will require for seeing distant objects distinctly.

2. If the glasses wanted are intended for reading with, or seeing near objects, let the near-sighted person multiply the distance at which he is able to read with ease with the naked eye, say 4 inches, by the distance at which he wishes to read, say 12 inches; divide the product 48 by the difference between the two, which in this instance is 8; the quotient, 6, is the focal length in inches of the glass which is required.

It is a very common error with those persons who begin to use concave glasses, to tire of those which they first employ, and have recourse to deeper ones. To these the eyes do not fail (at least for a time) to accommodate themselves; but, in the end, the patient, who thus proceeds from one degree of concavity to a greater, will find it difficult to obtain glasses sufficiently deep to afford him much assistance, or he may produce such weakness of the retina, or amblyopia, as shall render him unfit to engage in any ordinary pursuit. Near-sightedness generally continues, as has been already stated, in nearly the same degree during the greater part of life. Therefore, the same glass will continue, for many years, to afford precisely the same assistance, and ought not to be heedlessly changed for one of deeper concavity.

Dr Kitchener tells us, that he was about fifteen years old, when he first discovered that he could not discern distant objects so distinctly as people who have common eyes usually do. "Seeing" says he, "that I could not see what persons with common eyes frequently pointed out to me as well deserving my attention, I paid a visit to an optician, and purchased a concave eye-glass No. 2. After using this some little time, I accidently looked through a concave No. 3, and finding my sight much sharper with this than with No. 2, had my spectacles glassed with No. 3, which appeared to afford my eye as much assistance as it could receive. After using No. 3 for a few months, I chanced to look through No. 4, and again found the same increase of sharpness, &c. which I perceived before when I had been using No. 2 and first saw through No. 3, therefore concluded that I had not yet got glasses sufficiently concave, and accordingly procured No. 4; however, this soon became no more stimulus to the optic nerve than its predecessors Nos. 2 and 3 had been. I then began to think that the sight was subject to the same laws which govern the other parts of our system, *i. e.* an increased stimulus by repetition soon loses its power to produce an increased effect. Therefore, I refused my eye any further assistance than it received from spectacles glassed with No. 2, which I have worn for upwards of thirty-one years, and it is very nearly, if not quite as sufficient help to me now, as it was when I first employed it."[15]

The same author recommends persons who are extremely short-sighted, in order to prevent their being obliged to stoop, in writing, reading music, and the like, to wear spectacles with very shallow concaves, just enough to enable them to see the objects required in such cases, at the same distance with other persons; but for distant objects, to use a small opera-glass, which having an adjustable focus, if it magnifies only twice, will be infinitely better than any single concave, because it can be exactly adapted to the various distances.

It is advisable that near-sighted persons should not wear spectacles constantly, but only on occasions when they more particularly require such assistance. When they have been worn for a considerable time, the person does not at first see so well on leaving them off as he did before; but this is only temporary.

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[1] From *μύω, I shut*, and *ὤψ, the eye*; the *μυωψ* or short-sighted person being in the habit of winking or half-shutting his lids, when he endeavours to see objects distinctly.

[2] Complete System of Optics, Vol. ii. p. 2; Cambridge, 1738.

[3] Morbid Anatomy of the Human Eye, Vol. ii. p. 229; London, 1818.

[4] Philosophical Transactions, Vol. ciii. p. 34; London, 1813.

[5] Mémoires de l'Académie Royale des Sciences, pour 1727; p. 346; Amsterdam, 1732.

[6] Hygiène Oculaire, par J. H. Reveillé-Parise, p. 32; Paris, 1816.

[7] Manuel d' Anatomie Générale, Descriptive, et Pathologique, traduit par Jourdan et Breschet, Tome iii. p. 244; Paris, 1825.

[8] See Henry, in Memoirs of the Literary and Philosophical Society of Manchester, Vol. iii. p. 182; Warrington, 1790.

[9] Philosophical Transactions, Vol. ciii. p. 31; London, 1813.

[10] Sir C. Blagden here employs the word *meniscus*, (from μήνη, *moon*,) in a sense, which, though perhaps vindicated by occasional practice, it were better to avoid. A watch-glass is merely a segment of a hollow sphere, the surfaces of which are concentric.

[11] Philosophical Transactions, Vol. ciii. p. 110; London, 1811.

[12] Magiæ Naturalis, sive de Miraculis Rerum Naturalium, Libri iv; fol. 118; Antuerpiæ, 1560.

[13] Experiments and Observations on several Subjects in Optics, p. 99; London, 1818.

[14] Concave glasses ought always to be distinguished by their focal lengths, and never by numbers, because the gradations of concavity are not always worked to a certain standard, so that what one optician calls No. 1, another rates as No. 2, and so on. I find No. 1 to be 48 inches' focus in one shop, and 24 inches in another; No. 12, to be 10 inches' focus in one, and 4½ in another. Mr Ramsden made the first number of his concave glasses equivalent to a convex of 24 inches' focus, *i. e.* if a convex of that focal length were united to a concave No. 1, the combination would be equivalent to a plane, and objects would appear through the two glasses neither larger nor smaller than they really are. No. 2 he made to correspond to a 21 inch convex; No. 3 to an 18; and so on.

The following are the foci in inches of a set of concave glasses which I keep by me, with which to try myopic eyes.

No. 1 - - 48	No. 5 - - 14	No. 9 - - 5
2 - - 36	6 - - 12	10 - - 4
3 - - 24	7 - - 9	11 - - 3
4 - - 18	8 - - 7	12 - - 2½

In Germany, what is called No. 1 is commonly of the focal length of 2½ or 3 inches, and each following number has an inch, or a certain number of lines, of additional focal length.

The focus of a concave lens may be ascertained, by reflecting from its surface, upon an opaque body, the image of any very distant luminous object, such as the sun, observing when the image becomes smallest, and measuring the distance between the centre of the reflecting surface and the body upon which the image is received. Double this distance is the focal length of the lens, and is equal to the radius of curvature of its surfaces, these being ground on the same tool. The two surfaces, however, are not always ground on a tool of the same radius, so that the one side is sometimes deeper than the other.

[15] Economy of the Eyes, Part I. p. 111; London, 1826.

SECTION II.—PRESBYOPIA,[1] OR FAR-SIGHTEDNESS; DIMINISHED REFRACTION.

Although this state of defective vision, the general nature of which has been explained at the beginning of the last section, occasionally occurs, like myopia, suddenly, and at any period of life, yet, in by far the greater number of instances, it is merely part of the changes, which the human system undergoes from advancing years. The refractive powers of the eye becoming too feeble, or its axis shorter than natural, the rays of light are not converged sufficiently soon to be brought into focal points upon the retina. The image, therefore, is diffused, and the perception indistinct; to remedy which, the individual moves the object of examination to a greater distance from his eye than his previous point of distinct vision, by this means counteracting the tendency of the rays of light, proceed-

ing from the object when at the usual distance, to collect into foci, not upon the retina, but behind it.

Symptoms.—1. *Objective symptoms.* The objective symptoms, which generally attend presbyopia, are an apparent diminution in the size of the eyeball, which is also more sunk in the orbit; flatness of the cornea, shortening of the axis of the anterior chamber, and smallness of the pupil.

2. *Subjective symptoms.* It is, in general, about the age of 45 years, that we discover we see near objects less perfectly, especially by candle light, and that we are obliged at once to illuminate them more, and remove them farther from the eye, than formerly. The discovery, that the eye is thus beginning to be impaired by age, is gradually made, in consequence of the difficulty which the individual experiences in reading small print, nibbing his pen, threading her needle, and the like. On attempting to examine any small object close at hand, its outline becomes obscure, as if it were seen through a mist; very minute objects, such as the characters of a small printed book, are either not discerned at all, or they seem obscure, running apparently into one another, or appearing double; and if the attempt to see such objects is persevered in, the eyes soon feel fatigued, and the head begins to ache. Distant objects continue to be seen as before. The person can read a distant inscription, or tell the hour by a distant church clock, when he cannot read a common printed book held in his hand, or see the figures and hands of a watch.

As years continue to advance, the presbyopic defect generally becomes more decided, the eye appears to lose more and more the power of discerning near objects with distinctness, so that the individual, unless he has recourse to the aid of glasses, is forced to renounce all employments which require minute inspection; or, if he has begun the use of glasses, he is obliged to change them from time to time, in proportion as the refractive power of his eyes decreases. There are, however, great differences in the progress of far-sightedness in different individuals. Some eyes at 30 years of age, require the aid of convex glasses as much as others do at 50, while the sight of certain individuals continues almost as perfect at 50 as it was at 30. Young men of 20 sometimes cannot see to read or write without convex glasses of six or eight inches' focus, while persons of 80 years, and upwards, are occasionally met with, who are able to read even a small print, at the ordinary distance, without assistance. Some, after commencing the use of spectacles, are obliged every few years to change them for others of shorter focus; others change them only once or twice in the course of a prolonged old age, or continue for perhaps 40 years together to see satisfactorily with the aid of the same glasses. These and similar differences depend upon the original formation of the eyes, how they have been used, and the general health and constitution of the individual.

The few, who, after the age of 40, can see quite as well by candle-light, as they could before that age, will generally find that there is

a small degree of shortness in their sight, which is the cause of their possessing that advantage longer than persons in general do. If they try a very shallow concave glass, they will find it give a decided outline to distant objects, which they never saw so sharply defined before.

Instances occasionally occur of old persons, long accustomed to use convex glasses of considerable power, recovering their former sight at the advanced age of 80 or 90 years, so that they no longer require any artificial assistance even in reading. Dr Porterfield was led to attribute this remarkable amendment to a decay of the adipose substance at the bottom of the orbit, in consequence of which, he supposes that the eye, from a want of its usual support, will be brought by the pressure of the muscles on its sides, into a kind of oval figure, in which state the retina will be removed to a due distance from the flattened cornea.[2] Mr Ware objects to this explanation, that we never see a morbid accumulation of adipose substance in the orbit produce presbyopia, but that on the contrary, myopia is sometimes induced by that cause; and thinks it more probable, that the remarkable revolution in question is occasioned by an absorption of part of the vitreous humour, in consequence of which the sides of the sclerotica are pressed inward, and the axis of the eye proportionably lengthened.[3]

Although the eye, after middle life, loses the power of distinguishing near objects with correctness, it generally retains the sight of those that are distant. Instances, however, are not wanting of persons of advanced age, requiring the aid of convex glasses to enable them to see distant, as well as near, objects. Thus, Dr Wells informs us, that when 20 years younger, he was able, with his left eye, to bring to a focus on the retina, pencils of rays which flowed from every distance greater than seven inches from the cornea; but by the time he reached the age of 55, his eyes had altered considerably, with respect to their seeing near objects distinctly, and he had, in consequence, been obliged, not only to use convex glasses, but to change them several times for others of higher power. On carefully examining the state of his sight, previously to the repetition of some optical experiments, he found, to his great surprise, that the power of adapting his eyes to different distances was completely gone; in other words, that he was obliged to regard all objects, whether near or remote, in the same refractive state of those organs. He found that he required not only a convex glass of six inches' focus, to enable him to bring to a point on the retina rays proceeding from an object seven inches from the eye, but likewise a convex glass of 36 inches' focus, to enable him to bring to a point parallel rays.[4]

Causes. There can be no doubt that deficient refraction is the proximate cause of presbyopia, and that it is intimately connected with the decline of life. It is also said that it is more apt to recur in those who have used their eyes much upon remote objects.

With regard to the efficient causes, flatness of the cornea from

diminution in the quantity of the aqueous and vitreous humours is the one most frequently mentioned, this diminution being supposed to depend on the impeded manner in which the function of secretion is performed in advanced life.

Diminished density of any of the refractive media of the eye, or diminished convexity, will prove a sufficient cause of presbyopia. So far as the crystalline lens is concerned, it is generally admitted that its density increases as age advances, which should tend to counteract any presbyopic tendency, arising from flattening of the cornea or deficiency of the aqueous or vitreous humours. At the same time, the increase of density of the lens may possibly be attended by a degree of shrinking, by which its form may be rendered less convex, and its refractive power diminished. I believe flattening of the lens, much more than of the cornea, to be the cause of presbyopia.

It appears to be the general opinion, that along with diminished refraction, there attends upon presbyopia a loss of that power of accommodation to the perception of near objects, which is possessed by the healthy eye. Whether this power depends on a change of form or of place in the crystalline lens, or on both of these, or on some change different from either, it is easily conceivable that a partial or total loss of this power would be quite analogous to the diminished activity which takes place in all the functions of the body on the approach of old age.

Prevention and Treatment. Although it would be in vain to expect any plan of treatment to have the effect of removing, or perhaps even lessening a degree of presbyopia already produced in consequence of advanced age, it is but reasonable to suppose that by avoiding whatever over-fatigues the sight, and by following whatever tends to delay the progress of decrepitude, this defect may in a considerable measure be warded off. It is only to such influences, added to an original soundness of constitution, that we can attribute the exemption from presbyopia, which is occasionally possessed by men far advanced in life, and who have never been myopic.

The assistance which the presbyopic eye derives from a double-convex glass, ought neither to be too soon had recourse to, nor too long delayed. Many injure their sight, by adopting the use of magnifiers suddenly, and before they have any need of them; while others, actuated perhaps by a desire of concealing their age, refrain from employing them long after the period when glasses would not merely have afforded valuable assistance, but have proved a means of saving their sight. The presbyopic eye, if refused assistance, is necessarily strained by every attempt to perceive near objects, and suffers more in a few months by forced exertion, than it would do in as many years, if assisted by such glasses as would render vision easy and agreeable.

It would evidently be absurd to fix upon any period of life at which glasses should be first employed, or at which the presbyopic eye should be assisted by stronger magnifiers than those made choice

of in the first instance; but it may be laid down as a general rule, that whenever a person of 45 years of age, or upwards, finds, that in order to see small objects distinctly, he is obliged to carry them far from his eye; that he moves, as it were instinctively, nearer to the light, when he wishes to read or work, or holds the book or other object close to the light, in order to see with facility; that very small objects, after he has looked at them earnestly for some time, appear confused; that his eyes, after slight exertion, become so much fatigued, that he is obliged to turn them to other objects, in order to give them some relaxation; and that the sight, on awakening in the morning, is very weak, and does not recover its customary degree of force for some hours; then, he may, if he has not hitherto used convex glasses, begin to use them, or if he has already had recourse to those of a very long focus, he may change them for a pair of shorter focus, or, in other words, of greater refractive power.

A double-convex glass improves the vision of a presbyopic eye, simply by lessening the divergence of the rays of light proceeding from near objects, and thus ensuring their being brought into foci upon the retina. To see distant objects with distinctness, glasses are in general not required by the presbyopic eye; on the contrary, parallel rays being sufficiently converged by the refractive media of the eye itself, to be brought to their respective foci on the retina, the convex glasses must be laid aside, when objects at a distance are to be examined.

As a meniscus will produce the same effect as a double-convex glass, in enabling the presbyopic eye to perceive near objects with distinctness, while it will allow the eye greater latitude without fatigue, Dr Wollaston has recommended the former as a *periscopic* glass for far-sighted persons.

Similar directions must be followed in choosing convex glasses as in selecting concave ones; *viz.* that the lowest power, or longest focus, which answers the purpose, is to be chosen; and that as the concave glasses made use of by the near-sighted should not make objects appear smaller, neither should the convex glasses employed by the far-sighted make them appear larger than natural.[5]

If on trying the eyes separately, the individual discovers that one of his eyes only has become presbyopic from age, while the other is near-sighted from an original difference in conformation, he will find a reading glass, of about three inches in diameter, and of 12 or 14 inches' focus, to answer him much better than spectacles.

Persons at a distance from an optician, may determine the focal length of the convex glasses, which they will require, by means of the following rules.

1. If they have a distinct vision of objects *moderately remote*, let them multiply the distance at which they see minute objects most distinctly, say 20 inches, by the distance at which they wish to read by the aid of glasses, say 12 inches, and divide the product, 240, by the difference between the two, 8; the quotient, 30, will be the focal length of the glasses required.

2. If the distance at which the person sees most distinctly be *very great*, then the focal length of the glasses required will be equal to the distance at which he wishes to see objects most distinctly.

Convex glasses of about 36 inches' focus are often used by ignorant people, under the name of *preservers*, before their sight has attained that degree of presbyopia, which renders the use of glasses necessary. They seem to think that *preservers* have some specific power of arresting the progress of that failure of the sight, which is the natural consequence of age.

As it is chiefly by candle light that the presbyopic patient complains of his deficient sight, even after he has supplied himself with proper glasses, it is advisable that he should refrain, as much as possible, from employing himself at night in occupations, which require intense use of the organs of vision. The moment that the eyes begin to feel hot and fatigued, while the individual is occupied in reading, writing, or the like, especially by candle-light, he should take the hint, and allow them a period of repose.

When presbyopia occurs suddenly in subjects much under the age of 40 years, it will lead us to suspect, either some derangement of the internal parts of the eye, some pressure behind the eyeball, or some disease of that portion of the optic apparatus which is contained within the cranium. Instances of this sort have occurred even in children, and have sometimes yielded to the use of evacuating remedies. Thus, Mr Ware mentions the case of a boy of eight years old, who suddenly became presbyopic, and was repeatedly punished at school, on account of his incorrect and defaced writing, the real cause being unknown to his master. After the presbyopia had continued a fortnight, and different local applications had been used without producing any sensibly good effects, a cure was accomplished by the application of leeches to the temples, and the use of purgative medicines. Two sisters of this patient were similarly affected. The elder, 20 years of age, had never been able to do fine work, and for three years had been greatly assisted by convex spectacles. The younger, a girl of 15, had been presbyopic for about a year, being obliged to use glasses whenever she read, or worked with her needle. This patient, in the course of six weeks, during which she totally abstained from the use of glasses, was completely relieved from the necessity of using them, by the application of two leeches to each temple twice a-week. The elder sister, in the same space of time, experienced much relief from similar treatment, but was still unable to do fine work without glasses, partly in consequence of the long continuance of the infirmity, and partly on account of her not having abstained from the use of her spectacles with equal steadiness.[6]

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[1] From πρέσβυς, *old*, and ὤψ, *eye*; this being a state of vision to which old age is almost invariably subject.

[2] Treatise on the Eye, Vol. ii. p. 70; Edinburgh, 1759.

[3] Philosophical Transactions, Vol. ciii. p. 42; London, 1813.

[4] Ibid. Vol. ci. p. 380; London, 1811.

[5] Convex glasses are kept in the shops of every focal length, from 48 inches to six. It is evident, that no certain estimate can be formed from a person's age, of the focal length of the glass which he will require; although perhaps the following may be received as a tolerable approximation to an average, upon this head.

Years of age,	40	45	50	55	58	60	65	70	75	80	85	90	100
Focal lengths in inches,	36	30	24	20	18	16	14	12	10	9	8	7	6

The focus of a convex glass may be measured by holding it near the side of a room, facing a window, or opposite to the sun, and moving it slowly backwards and forwards, until the image of the window frame, or of the sun, upon the wall, becomes smallest and most distinct. The distance between the glass and the wall at that moment is the focal length.

[6] Philosophical Transactions, Vol. ciii. p. 48; London, 1813.

SECTION III.—IRREGULAR REFRACTION.

It is probable that irregular formations of the cornea, or of the crystalline lens, are much more common than is generally supposed, and that few eyes, in fact, are perfectly free from them. If they are very considerable, they may be detected by the observer's watching the progress of a candle in front of the patient's eye, and noticing the appearances of the three reflected images. The patient may detect them by closing one eye, and directing the other to a very narrow well-defined luminous object, not too bright, (the horns of the moon, when a slender crescent, only two or three days old, are very proper for the purpose,) and turning the head in various directions. The line will be doubled, tripled, multiplied, or variously distorted; and careful observation of its appearance, under different circumstances, may lead the patient to a knowledge of the peculiar conformation of the refracting surfaces of the eye which causes those appearances, and may suggest the proper remedy.

M. Prévost, at the age of 81 years, published[1] an interesting account of his own case of double vision with a single eye, which he thought might perhaps arise from a fracture, bruise, or partial flattening of the lens, or separation of its laminæ. M. Prévost also communicated with Mr Babbage, who is affected in either eye singly with double vision, a defect, however, which he finds himself able to remedy, by looking through a small hole in a card, or through a concave lens.

Dr Young tells us,[2] that his "eye, in a state of relaxation, collects, to a focus on the retina, those rays which diverge vertically from an object at the distance of 10 inches from the cornea, and the rays which diverge horizontally from an object at seven inches distance."

A similar instance of irregular refraction has been adduced by Professor Airy, in the case of one of his own eyes; which, from a certain defect in the figure of its lenses, he ascertained to refract the rays to a nearer focus in a vertical than in a horizontal plane. This would take place if the cornea, instead of being a surface of

revolution, in which the curvature of all its sections through the axis must be equal, were of some other form, in which the curvature in a vertical plane is greater than in a horizontal.

The correction of such a defect could never be accomplished by the use of spherical lenses. The strict method, applicable in all such cases would be to adapt a lens to the eye, of nearly the same refractive power, and having its surface next the eye an exact *intaglio* fac-simile of the irregular cornea, while the external surface should be exactly spherical, and of the same general convexity as the cornea itself. The necessity, however, of limiting the correcting lens to such surfaces as can be truly ground in glass, to render it of any and every-day use, and which surfaces are only spheres, planes, and cylinders, suggested to Professor Airy the ingenious idea of a double concave lens, in which one surface should be spherical, the other cylindrical. The use of the spherical surface was to correct the general defect of a too convex cornea. That of the cylindrical may be thus explained:—Suppose parallel rays incidental on a concave cylindrical surface A B C D, in a direction perpendicular to its axis, and let SS′ PP′ QQ′ TT′ be any laminar pencil of them, contained in a parallelepiped infinitely thin, and having its sides parallel to the axis. Any of the rays SP, S′P′, of this pencil lying in a plane APS perpendicular to the axis, will, after refraction, converge to, or diverge from, a point X, also in this plane; and, therefore, all the rays incident on PQ, P′Q′, will, after refraction, have for their focus the line XY, in the caustic surface AFGD, and the principal focus of the cylinder will be the line FG, whose distance from the vertex CC′ of the surface, or FC, is the same with the focal length of a spherical surface, formed by the revolution of AB about the axis FC. Thus a cylindrical lens produces no convergency or divergency in parallel rays, incidental in the plane of its axis; while it converges or diverges rays in a plane at right angles to the axis, as a spherical surface of equal curvature would do. If, then, such a cylindrical surface be conjoined with a spherical one, the focus of the spherical surface will remain unaltered in one plane, but in the other will be changed to that of a lens formed by it, and a spherical surface of equal curvature with the cylinder. Hence, by properly placing such a cylindro-spheric lens across the defective eye, its defect will be (approximately, at least,) counteracted.

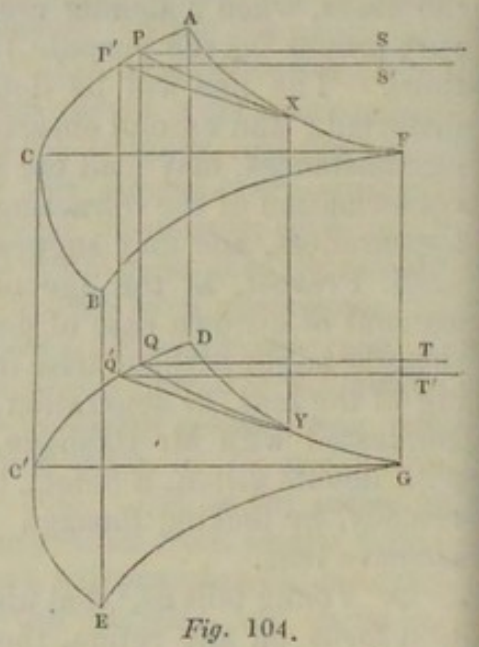

Fig. 104.

After some ineffectual applications to different workmen, Professor Airy at last procured a lens to his wish from an artist named Fuller, at Ipswich, the radius of the spherical surface being $3\frac{1}{5}$ in-

ches, of the cylindrical $4\frac{1}{2}$ inches. With its assistance, he could read the smallest print, at a considerable distance, with the left or defective eye, as well as with the right. He found that vision was most distinct when the cylindrical surface was turned from the eye; and as, when the lens was distant from the eye, it altered the apparent figure of objects by refracting differently the rays in different planes, he judged it proper to have the frame of his spectacles made so as to bring the glass pretty close to the eye. "With these precautions," says he, "I find that the eye which I once feared would become quite useless, can be used in almost every respect as well as the other."[3]

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[1] Annales de Chimie et de Physique, Tome li. p. 210; Paris, 1832.
[2] On the Mechanism of the Eye; Philosophical Transactions, for 1801.
[3] Quoted from the Transactions of the Cambridge Philosophical Society, in the Encyclopædia Metropolitana, article *Light*, p. 398, § 359.

SECTION IV.—INSENSIBILITY TO CERTAIN COLOURS.

Numerous instances are recorded of persons, who were liable to strange mistakes regarding the colours of objects, or were even totally unable to perceive certain colours. Some of the individuals in question appear to have been myopic, but the eyes of most of those who presented this defect are described as appearing in no way diseased or unnatural, and to have fulfilled their functions perfectly, so far as communicating ideas of the size, form, and distance of objects, from a cognizance of light and shade, was concerned.

Mr Huddart mentions the case of one Harris, a shoemaker at Maryport in Cumberland, who could distinguish only black and white, and who had two brothers almost equally defective, one of whom always mistook orange for green. Harris observed this defect when he was four years old. Having by accident found in the street a child's stocking, he carried it to a neighbouring house to inquire for the owner: he observed the people call it a *red* stocking, though he did not understand why they gave it that denomination, as he himself thought it completely described by being called a *stocking*. The circumstance, however, remained in his memory, and together with subsequent observations, led him to the knowledge of his defect. He observed, for instance, that other children could discern cherries on a tree by some pretended difference of colour, though he could distinguish them from the leaves by their difference only in size and shape.[1]

Another case of a Mr Scott, is recorded, to whom full reds and full greens appeared alike, while yellows and dark blues were very easily distinguished. Mr Scott's father, his maternal uncle, one of his sisters, and her two sons, had all the same imperfection.[2]

Dr Dalton, the celebrated chemist, cannot distinguish pink from

blue, by daylight; and in the solar spectrum, the red is scarcely visible to him, the rest of it appearing to consist of two colours, yellow and blue. He appears to have remained long unconscious of his defect; and was led, rather to suppose that there existed some perplexity in the nomenclature of colours, than any incapability in his own power of distinguishing them.[3]

Those who feel inclined to examine the particulars of other instances of this sort, may consult the works referred to in the note.[4] They will find, on doing so, that the chief peculiarities of these cases are, the confounding of red with green, and pink with blue; in other words, that red light, colours in which it forms an ingredient, and its accidental colour, are not distinguishable by those who labour under the defect in question. Red appears to them merely a *dark colour*, and green a *shade of drab*. Yellow and blue are the only colours they can truly distinguish. They judge of orange, purple, and brown, with great difficulty; and even the shades of black, gray, and white, they are often unable to decide upon without hesitation. Yellow and blue appear to them entire opposites, as much so as black and white. The eyes of an individual, examined very carefully by Sir John W. F. Herschel, were capable of fully appreciating only blue and yellow tints, and these names uniformly corresponded in the nomenclature of that individual to the more or less refrangible rays generally; all belonging to the former indifferently exciting a sense of blueness, and the latter of yellowness.[5] Mention has been made of individuals seeing well in other respects, but devoid altogether of the sense of colour, distinguishing different tints only as brighter or darker than another; but such a case is, probably, one of extremely rare occurrence.

At Dr Nicholl's suggestion, one patient made the curious observation, that on fatiguing his sight, at different times, with gazing upon spots of red and green, laid on a white ground, the eyes became painfully affected, but no accidental colour made its appearance.

We should scarcely suppose, that a deficiency in the perception of colours could be attended with any advantage; yet in one respect, this appears to be the case. "I see objects," says one of the subjects of this defect, "at a greater distance and more distinctly in the dark than any one I recollect to have met with; this I discovered many years before I was aware of my defective error in colours."[6] Another makes the following observation on the same point. "All objects whatever, when viewed at a distance, lose their local colouring, and assume more or less, of a pale, or azure blue tinge, which painters term the colour of the air, which is interposed between the spectator, and the distant object. No colour contrasts to me so forcibly with black as this azure blue, and as you know that the shadows of all objects are composed of black, the forms of objects which have acquired more or less of this blue hue, from being distant, become defined, and marked by the possession of shadows, which are invisible to me in the high-coloured objects

in a fore-ground, and which are thus left comparatively confused, and shapeless masses of colour. So much is this the case with me, when viewing a distant object, as to overcome the effect of perspective, and the shading in the form, and the garments of human beings at some distance from my eye, is often so predominant, and marks them so distinctly, as to overcome the effect of diminution of size; and although I see the object most distinctly, I am unable to tell whether it be a child near me, or a grown-up person at a considerable distance."[7] In a case recorded by Turberville, the patient could read in a very obscure light.[8]

I always considered this affection as a congenital one, till I was consulted by a man who had gradually become subject to it. He was by trade an ornamental painter, and could judge at one time perfectly of colours. His right eye was affected with mydriasis when he called upon me, and there was incomplete amaurosis of both eyes, so that he could no longer read a common type. On trying him, I found he mistook red and green. The use of spirits and tobacco was probably the cause of the affection of sight in this individual.

Causes. The following are some of the notions which have been formed regarding the probable causes of insensibility to colours.

1. Dr Dalton thinks it probable that the red light is, in these cases, absorbed by the vitreous humour, which he supposes may have a blue colour; a very unlikely conjecture at the best, but which appears to be refuted by the simple experiment of looking through a pair of green or blue glasses. When we do so, we still recognise every primitive colour in bodies, with a shade merely of green or blue over them. Therefore, supposing the rays of light to pass through a blue vitreous humour, it does not follow that objects should appear blue, or that we should be prevented from discerning red light, or any other colour. In old age, we view all objects through an amber-coloured crystalline lens, and yet see every thing of its natural hue.

2. A writer in the Edinburgh Journal of Science,[9] going on the supposition that the choroid coat is essential to vision, gives it as his conjecture, that the loss of red light in the subjects of this defect, arises from the retina itself having a blue tint, so that the light, falling upon the choroid coat, being deprived of its red rays by the absorptive power of the blue retina, the impression conveyed to the retina by the choroid, will not contain that of red light.

3. Dr Young, adopting apparently the notion of Darwin, that the retina is active not passive in vision, regards it as the simplest explanation of this defect, to suppose that those fibres of the retina, which are calculated to perceive red, are absent or paralysed.

4. Sir David Brewster conceives that the eye, in these cases, is insensible to the colours at one end of the spectrum, just as the ear of certain persons has been proved, by Dr Wollaston, to be insensible to sounds at one extremity of the scale of musical notes, while it is perfectly sensible to all other sounds.

5. The phrenologists maintain, that the faculty of distinguishing colours does not depend on the eye, but on a particular part of the brain, to which they give the name of the *organ of colour;* and that in those who are deficient in judging of colours, the defect lies in this organ, and not in the eyes, the mechanical construction and optical effects of which appear to be perfect in the individuals in question. This view of the matter appears also to be adopted by Sir John W. F. Herschel. "We have examined," saye he, "with some attention, a very eminent optician, whose eyes (or rather eye, having lost the sight of one by an accident) have this curious peculiarity, and have satisfied ourselves, contrary to the received opinions, that all the prismatic rays have the power of exciting and affecting them with the sensation of light, and producing distinct vision, so that the defect arises from no insensibility of the retina to rays of any particular refrangibility, nor to any colouring matter in the humours of the eye preventing certain rays from reaching the retina, (as has been ingeniously supposed,) but from a defect in the sensorium, by which it is rendered incapable of appreciating exactly those differences between rays on which their colour depends."[10]

On whatever cause an insensibility (partial or complete) to colour depends, it is a state of vision for which there appears to be no remedy.

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[1] Philosophical Transactions, Vol. lxvii. p. 260; London, 1777.
[2] Ibid. Vol. lxviii. p. 611; London, 1779.
[3] Memoirs of the Literary and Philosophical Society of Manchester, 1st Series, Vol. v. p. 28; Manchester, 1798.
[4] Nicholl, in Medico-Chirurgical Transactions, Vol. vii. p. 477, and Vol. ix. p. 359. Also, in Annals of Philosophy, New Series, Vol. iii. p. 128. Butter, in Transactions of the Phrenological Society, p. 209. Combe, Ibid, p. 222. Harvey, in Transactions of the Royal Society of Edinburgh, Vol. x. p. 253. Also, in Edinburgh Journal of Science, Vol. v. p. 114. Brewster, in Edinburgh Journal of Science, Vol. iv. p. 85. Phrenological Journal, Vol. iii. p. 265; and Vol. vii. p. 152. Colquhoun, in Glasgow Medical Journal, Vol. ii. p. 12.
[5] Article *Light*, in Encyclopædia Metropolitana, p. 435, § 507.
[6] Medico-Chirurgical Transactions, Vol. ix. p. 361; London, 1818.
[7] Glasgow Medical Journal, Vol. ii. p. 14; Glasgow, 1829.
[8] Philosophical Transactions, No. 164; or Lowthorp's Abridgement, Vol. iii. Part i. p. 40.
[9] Vol. iv. p. 86.
[10] Op. Cit. p. 434, § 507.

SECTION V.—CHRUPSIA,[1] OR COLOURED VISION.

It is evident, that in health we should suffer no imitations of visual sensations, no flashes of light from internal changes in the eye, no false perceptions of any kind; that we should see objects of their natural colours, not tinged with hues entirely foreign to them, or of which they in general appear to be free; and that we should have

the consciousness of being impressed by the view of external objects, only when such objects are present and actually affecting our organs of vision. Yet such is the constitution of the optic apparatus, that by various derangements to which it is liable, we become the subjects of many sensations, which have actually no prototype. Even a mere defect of power in this apparatus, frequently gives rise to false sensations.

Circulating through the immediate organ of visual sensation, the blood, during a state of perfect health, makes no visual impression on that organ; but let the circulation through the retina, and neighbouring parts, be either accelerated or impeded, and certain morbid sensations are apt to be produced. One of these is what is called *seeing the circulation of the blood in the eye.* Thus Sauvages observes, that the pulsations of the ophthalmic artery may be perceived, by looking attentively on a white wall, well illuminated. A kind of network, darker than the other parts of the wall, appears and vanishes alternately with every pulsation. This change of colour of the wall he ascribes to the compression of the retina, by the diastole of the artery.[2]

In this, and the next four sections, we shall notice some of the most remarkable false visual sensations. The first is what is called *chrupsia*, or coloured vision.

Patients, who are partially amaurotic, complain not unfrequently of luminous objects, as, a lighted candle, appearing to be surrounded by the colours of the rainbow. This symptom has been called chrupsia, and has been supposed to depend on some derangement of the lenses of the eye, by which the achromatic power of the organ becomes impaired. A young lady whom I attended for choroiditis, saw brilliant blue, green, and red colours playing over the objects she regarded, such as the face of a person sitting before her, or a white handkerchief held in her hand. In supposed cases of this sort, it would be proper to guard against our being deceived on the one hand, by those causes, which might induce a decomposition of the rays of light by inflection merely, such as contraction of the eyelids, and, on the other, by such as might bring on ocular spectra.

Another variety of chrupsia, consists in seeing objects of a different colour from that which is natural to them. Some patients see objects as if tinged of a yellow, green, or bluish colour. Dr Parry relates[3] four cases of this sort. In one of these, an old general, just before the lighting of the candles in the evening, and for an hour on first waking in the morning, saw all white objects of a deep orange colour, approaching to scarlet. In another, a lady often saw white objects of a very bright blue colour.

A patient under my care with prolapsus of the nasal portion of the iris through an accidental wound of the cornea, saw all objects of a greenish hue.

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[1] More correctly *chroopsia*, from χρόα, *colour*, and ὄψις, *vision*.

[2] Nosologia Methodica, Vol. ii. p. 180; Amstelodami, 1768. See also Darwin, in Philosophical Transactions, Vol. lxxvi. p. 344; London, 1786. Purkinje's Beobachtungen und Versuche zur Physiologie der Sinne, Vol. i. Prag, 1823; Vol. ii. Berlin, 1825.

[3] Collections from the unpublished Medical Writings of C. H. Parry, M.D. Vol. i. pp. 560, 568, and 569; London, 1825.

SECTION VI.—PHOTOPSIA.[1]

That sensations of light may be excited independently of the ordinary impressions from external objects, is familiarly known. The flash, produced upon sneezing, or by gentle pressure, or a sudden blow on the eye, or by the passage of the Galvanic influence through different parts of the face, as in the simple experiment of applying a piece of zinc and a piece of silver to the tongue, and then bringing them into contact, is generally considered as sufficient proof, that the retina may be so impressed, as to produce the sensation of light, altogether independently of the actual presence of light. In the last three cases, the effect is produced whether the eyes be opened or closed, and in all of them, whether the experiment be made in daylight or in the dark.

In like manner, there are sensations of light, which are altogether the result of disease in the optic apparatus. Flashes of light, the appearance of shining stars, a glittering as if from the points of innumerable needles, or the sides of innumerable prisms, and a variety of other lucid spectra attend retinitis, and occur in the commencement of certain kinds of amaurosis. In some peculiar and distressing cases, the patient is annoyed by the sensation as if his eyes were directed towards globes of light swimming or revolving before him, or as if he were looking at a sea of molten gold.

The distress, which patients affected with such false sensations experience, varies greatly in degree; but, on the whole, these lucid spectra are both less supportable by those who experience them, and ought to be regarded as of a more alarming nature, than the semi-transparent or dark *muscæ volitantes*, which so frequently occur. Flashes of light are often the precursors of convulsive attacks, such as epilepsy; subjects inclined to apoplexy, on raising their heads after stooping, see showers of shining spectra; those who have suffered from internal ophthalmia are often troubled with such sensations as that of a luminous wheel rapidly revolving before them; and phrenitis is attended by false impressions of the same sort, which often continue long after all the other symptoms have ceased. In some instances, photopsia is merely a sympathetic effect produced from disordered digestion. After fever, or any disease in which the patient lies long in the horizontal position, photopsia is liable to occur. It generally subsides, as the patient becomes able to sit up.

It is of great importance, to ascertain the cause of photopsia, and

to distinguish it accurately from photophobia. (See pages 175, 414, 500.) The latter often simulates the former, especially in scrofulous, hypochondriacal, and hysterical patients. The cause of photopsia being discovered, the line of treatment can scarcely be mistaken. Sir David Brewster tells[2] us, he knew of a case, in which the patient had constantly the sensation of a luminous circle before him, in consequence of an excrescence on the inside of the eyelid, which produced a continued pressure on the eyeball. The removal of the excrescence would afford a cure in this case. When photopsia is owing to cerebral congestion, depletion will be necessary; when dyspepsia is the cause, purgatives, followed by tonics, will be proper.

The following interesting case of photopsia has been recorded by Mr Ware, in the words of the patient himself, a medical practitioner.

Case 278.—"About 10 years ago, when about 48 years of age, I experienced the first attack of the malady which I mean to describe; and it has repeatedly returned at irregular periods, from that to the present time. The first notice that I have of the attack is a peculiar indescribable sensation at the bottom of the eye, which does not amount to pain, and is so slight that its reality is not to be determined, unless I direct my attention very particularly to it. After a few seconds the objects, in a small point, nearly in the centre of the field of vision, become indistinct; and, shortly afterwards, invisible. * * * * In a few seconds more, that is, in about half a minute from the commencement of the attack, the point that was invisible becomes lucid, appearing to be a circular spot, about the eighth of an inch in diameter; in which a yellow flame seems to undulate from the centre to the circumference with almost coruscating quickness and splendour. This spot increases by the extension of the undulating flame until it acquires an apparent diameter of about three quarters of an inch, which takes place generally in about six or eight minutes. The fiery veil, which conceals objects, becomes then thinner in the centre, and objects are there seen through it. The vision increases, until at length a ring of light only remains, which continues to enlarge until it is lost by seeming to extend beyond the field of vision.

"The returns of the attack have been very irregular. Sometimes they have occurred daily for a week or ten days together; at other times more than a month has elapsed between their appearance. During one forenoon they returned almost every hour; but of late the intervals are much lengthened; and I have been now exempted from the malady more than three months.

"At first no pain was felt; but during the last 12 months, a slight uneasiness under the forehead, on the opposite side to that of the affected eye, has generally accompanied and succeeded the attack.

"The disease is common to both eyes, though it has never yet occurred in both at the same time. My sight is not injured, though the sensibility of the retina appears to be morbidly increased: a strongly illuminated object producing a more brilliant spectrum than it used to do.

"About six weeks ago I first saw the unpleasing appearance of a small dark circular spot, which, varying its situation with every motion of the eye, showed how appropriately the term musca volitans had been applied to it. The possibility of its being a partial paralytic affection, resulting from the frequent morbidly increased action of the retina, naturally alarmed me; but six weeks having elapsed without any return, I am become easy concerning it. In this instance the immediate cause of the affection appears to have been an irregularly increased action of the retina; and the remote causes were an over eager exercise of the mind, joined with too long continued employment of the eyes, and a disordered state of the stomach and bowels.

"With regard to the means of cure, reprehensible as it may appear, I for a long time employed none. About three years ago, however, having been harassed repeatedly at short intervals, and sometimes two or three times in the day; by the

above-mentioned appearances, I called on you, and, by your advice, took a dose of five grains of calomel. After this the spectrum did not appear for several months; and when I again saw it, it yielded to a repetition of the same remedy In the following year, having travelled two days together, and taken food of an improper kind, and in an irregular manner, the attacks on the third morning were so frequently repeated, that I was unable to see my way without difficulty and danger. I therefore stopped and took my dose of calomel; after which the spectrum immediately disappeared, and it did not return for many months. That which was black, as well as those which were lucid, were equally removed by the use of this medicine; and I have not now perceived either of them for a considerable length of time."[3]

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[1] From φὼς *light*, and ὄψις, *vision*. Μαμαρυγὴ of Hippocrates. *Visus lucidus.*
[2] Philosophical Magazine, for August, 1832, p. 90.
[3] Medico-Chirurgical Transactions, Vol. v. p. 274; London, 1814. See case of M. Savigny, Archives Générales de Médecine, Aout, 1838, p. 495.

SECTION VII.—OCULAR SPECTRA.

A short notice of this class of phenomena will not, I think, appear improper, if we consider that they are the result of fatigue of the eye, and that fatigue is not only in itself a disease, but is often the prelude to other diseases of more permanent character.

After long and attentively looking at a bright object, as, the setting sun, on closing the eyes, or turning them away from the object, an image, which resembles the object in form, continues for some time to be visible. This appearance is called the *ocular spectrum* of the object; and as it is often of a colour different from that of the object which has produced it, Buffon gave to the colours which arise in this way, from the continued action of light upon the retina, the name of *accidental colours*, in order to distinguish them from those which are produced by the decomposition of white light. Boyle[1] had previously called them *adventitious colours*.

Dr Robert W. Darwin considers[2] ocular spectra under four heads. To understand his views of the subject, it is necessary to know that he regards the retina as a fibrous substance, capable of a certain sort of activity, which produces vision, and capable even of spasmodic or irregular action.

I. The retina is not so easily excited into action by a less irritation, after having been lately subjected to a greater; and hence a class of ocular spectra *from defect of sensibility*, as in the simple experiment just referred to. Certain of the *muscæ volitantes*, complained of by people of delicate constitutions, when their eyes are a little weakened by fatigue, are probably ocular spectra of this kind.

II. The retina is more easily excited into action by a greater irritation, after having been lately subjected to a less; and hence a class of ocular spectra *from excess of sensibility*, as in the following experiment. Make with ink on white paper a very black spot, about half an inch in diameter, with a tail to it about an inch long, so as

to represent a tadpole; look steadily for a minute on this spot, and, on moving the eye a little, the figure of the tadpole will be seen on a white part of the paper, whiter or more luminous than the other parts of the paper. The part of the retina which was exposed to the black spot, is now more sensible to light than the other parts of it, which were exposed to the white paper. Dr Darwin regards this as put beyond a doubt by the following experiment. On closing the eyes after viewing the black spot on the white paper, a red spot is seen of the form of the black spot: for that part of the retina, on which the black spot was delineated, being now more sensible to light than the other parts of it, which were exposed to the white paper, is capable of perceiving the red rays which penetrate the eyelids.

III. There is a set of ocular spectra, which resemble their object in its colour as well as form. These Dr Darwin terms *direct ocular spectra.*

If, in the night, we place the bright flame of a spermaceti candle before a black object, look steadily at it for a short time, till it is observed to become somewhat paler, and then close the eyes, and cover them carefully, but not so as to compress them, the image of the blazing candle will continue distinctly visible. In this case, according to Dr Darwin, a quantity of stimulus somewhat greater than natural excites the retina into spasmodic action, which ceases in a few seconds.

If we place a spermaceti candle in the night about one foot from the eye, and look steadily on the centre of the flame, till the eye becomes much more fatigued than in the last experiment; on closing the eyes a reddish spectrum will be perceived, which will repeatedly cease and return. In this case, a quantity of stimulus somewhat greater than the former excites the retina into spasmodic action, which ceases and recurs alternately.

IV. There is a set of ocular spectra, of a colour contrary to that of their object. These may be called *reverse ocular spectra.* They are excited by a stimulus somewhat greater than what is sufficient to produce the direct spectra, and are supposed by Dr Darwin to depend on the retina falling into an opposite spasmodic action to that which had previously existed.

If we place a piece of coloured silk, about an inch in diameter, on a sheet of white paper, and about half a yard from the eyes, look steadily upon it for a minute, then remove the eyes to another part of the paper, a spectrum will be seen of the form of the silk, but of the opposite, or complementary, colour. Red silk will produce a green spectrum; green, a red one; orange, blue; blue, orange; yellow, violet; and violet, yellow. These reverse spectra are similar to a colour, formed by the combination of all the primary colours, except that with which the eye has been fatigued in making the experiment.

In contemplating any of these reverse spectra with the eye closed and covered, it disappears and re-appears several times successively,

till at length it entirely vanishes, like the direct spectra; but with this additional circumstance, that when the spectrum becomes faint or evanescent, it is instantly revived by removing the hand from before the eyelids, so as to admit more light. The retina, being still sensible to all the other rays of light, except that with which it was lately fatigued, is stimulated, by the admission of these rays, into those motions which form the reverse spectrum.

If the retina is excited by a stimulus greater than the last mentioned, it falls into various successive spasmodic actions. De la Hire observed, that after looking at the bright sun, the impression in his eye first assumed a yellow appearance, then green, and then blue.

Excited by a still greater stimulus, the retina may fall into a fixed spasmodic action, which may continue for some days. Thus, Dr Darwin found, that after having looked long at the meridian sun, till the disc faded into a pale blue, he frequently observed a bright blue spectrum of the sun on other objects all the next and succeeding day, which constantly occurred when he attended to it, and frequently when he did not.

A quantity of stimulus greater than the preceding induces a temporary paralysis of the organ of vision. Place a circular piece of bright red silk, about half an inch in diameter, on the middle of a sheet of white paper; lay them on the floor in a bright sunshine, and fixing the eyes steadily on the centre of the red circle, for three or four minutes, at the distance of four or six feet from the object, the red silk will gradually become paler, and finally cease to appear red at all.

The following miscellaneous facts regarding ocular spectra appear worthy of notice. The full illustration of them will be found chiefly in Dr Darwin's paper; and the reader may farther consult, on this subject, the works mentioned in the note.[3]

1. Though a certain quantity of light facilitates the formation of the reverse spectrum, a greater quantity prevents its formation, as the more powerful stimulus excites even the fatigued parts of the eye into action; otherwise we should see the spectrum of the last viewed object as often as we turn our eyes.

2. When a direct spectrum is thrown on colours darker than itself, it mixes with them; as the yellow spectrum of the setting sun, thrown on the green grass, becomes a greener yellow. But when a direct spectrum is thrown on colours brighter than itself, it becomes instantly changed into the reverse spectrum, which mixes with those brighter colours. So the yellow spectrum of the setting sun thrown on the luminous sky becomes blue, and changes with the colour or brightness of the clouds on which it appears. But the reverse spectrum mixes with every kind of colour on which it is thrown, whether brighter than itself or not: thus, the reverse spectrum, obtained by viewing a piece of yellow silk, when thrown on white paper, is a lucid blue green; when thrown on black Turkey leather, it becomes a deep violet. In these cases the retina is thrown into activity or

sensation by the stimulus of external colours, at the same time that it continues the activity or sensation which forms the spectra.

3. All experiments upon ocular spectra are apt to be confounded, if they are made too soon after each other, as the remaining spectrum will mix up with the new ones. This is a very troublesome circumstance to painters, who are obliged to look long upon the same colour; and in particular to those whose eyes, from natural debility, cannot long continue the same kind of exertion.

4. From some occasional phenomena observed in experimenting on the subject of ocular spectra, it would appear that an impression on the one retina can be conveyed to the other. Sir David Brewster taking advantage of a fine summer's day, when the sun was near the meridian, formed a very brilliant and distinct image of his disc, by means of the concave mirror of a reflecting telescope. His right eye being tied up, he viewed this luminous disc with the left through a tube, which prevented any extraneous light from falling upon the retina. When the retina was highly excited by the solar image, he turned his left eye to a white ground, and examined the series of ocular spectra which followed. After uncovering his right eye, a remarkable phenomenon appeared; for on turning it on a white ground, he found that it also gave a coloured spectrum. He repeated the experiment twice, in order to be secure against deception, and with the same result. The spectrum in the left eye was invigorated by closing the eyelids, because the images of external objects efface the impression upon the retina; and when he refreshed the spectrum in the left eye, that in the right was also strengthened. On repeating the experiment a third time, the spectrum appeared in both eyes, which seems to prove, that the impression of the solar image was conveyed by the optic nerve from the left to the right eye; for the right eye being shut, could not be affected by the luminous image.[4]

5. Ocular spectra sometimes continue for hours, days, or weeks, and are often followed in such cases by serious affections of the retina. Sir David Brewster found, after the experiments just quoted, that his eyes were reduced to such a state of extreme debility, that they were unfit for any farther trials. A spectrum of a darkish hue floated before his left eye for many hours, succeeded by the most excruciating pains, shooting through every part of the head. These pains, accompanied with a slight inflammation in both eyes, lasted for several days. Two years after, the debility of the eyes still continued, and several parts of the retina in both eyes had completely lost their sensibility.[5]

Buffon tells[6] us, that one of his friends having one day looked at an eclipse of the sun through a small hole, observed for more than three weeks a coloured image of that body upon all objects. When he fixed his eyes upon a brilliant yellow, as that of a gilt frame, he saw a purple spot; when on blue, as that of a slated roof, a green spot. Buffon himself brought on *muscæ volitantes* by his experiments on accidental colours.

Case 279.—In the month of July, a lady of advanced age went from London to the eastern coast of Kent, where she lodged in a house looking immediately upon the sea, and of course very much exposed to the glare of the morning sun. The curtains of the bed in which she slept, and also of the windows, were of white linen, which made her apartment very light. When she had been there about ten days, she observed, one evening, at the time of sunset, that first the fringes of the clouds appeared red, and soon after the same colour was diffused over all the objects around her. It was particularly conspicuous when she regarded any thing white, as a sheet of paper, a pack of cards, or a lady's gown. This lasted the whole night. The next morning her sight was perfectly restored. But as the evening advanced, the same appearances came on again; and they continued to do so regularly every evening, as long as she remained at that place, which was three weeks from the commencement of her complaint: the natural vision always returning in the morning. Six days after she had left the coast, Dr Heberden saw her in London, still subject to the same affection. It persevered a fortnight longer, and then, of its own accord, ceased suddenly and entirely. While it was upon her, the sight seemed to be no otherwise impaired than by the degree of indistinctness necessarily produced by this unnatural colour, which overspread all her view.[7]

There seems every reason to suppose that this lady's complaint was brought on by her being exposed to an unusual glare of light, and that it partook more of the nature of an ocular spectrum than of any thing else.

6. There must at all times, and from every object, be a tendency to the production of ocular spectra; but partly from habitual inattention to them, partly from their being effaced in the overwhelming effect of direct impressions, they are seldom made the subject of complaint, except by those whose eyes are peculiarly sensible, or have become greatly weakened by over-fatigue and other causes. In such persons a mixture of photopsia, muscæ volitantes, and ocular spectra is not uncommon. I knew a person, who had by night-study induced muscæ volitantes, and who was considerably troubled with photopsia during the early hours of rest, and in the morning with reverse spectra of the objects in his dressing-room, such as a black chair, which appeared in white whenever he turned his eyes to the walls of the room, and a framed print, the spectrum of which appeared black with a white edge, the result of a dark frame and whitish print. There are few, who, after retiring from the toils of the day, have not, at one time or another, been sensible, on shutting their eyes where only a very moderate quantity of light was present, of an impression as if from myriads of minute figures of various colours, appearing in constant motion, and assuming an endless succession of different arrangements. I presume that this sensation must in general be referred to the class of ocular spectra, and be regarded as the effect of the infinite variety of impressions made upon the retina through the course of the day.

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[1] Experiments and Considerations touching Colours, p. 15; London, 1670.

[2] Philosophical Transactions, Vol. lxxvi. p. 313; London, 1786.

[3] De la Hire sur les differens Accidens de la Vue, Mémoires de l'Académie Royale des Sciences, 1694. Jurin's Essay on Distinct and Indistinct Vision, at the end of Smith's Optics. Buffon sur les Couleurs Accidentelles, Mémoires de l'Académie Royale des Sciences, 1743. Porterfield on the Eye, Vol. i. p. 343.

Æpinus, Novi Commentarii Petropolitani, Tom. x. Mémoires de l'Académie Royale à Berlin, 1771. Haüy, Traité de Physique. Scherffer sur les Couleurs Accidentelles, Rozier's Observations sur la Physique, Tom. xxvi. pp. 175, 273, 291; Paris, 1785. Article, *Accidental Colours*, in the Edinburgh Encyclopædia. Locke's Life by Lord King, Vol. i. p. 405. Brewster's Life of Sir Isaac Newton, p. 315. Müller's Elements of Physiology, Translated by Baly, p. 1179.

[4] Article, *Accidental Colours*, in the Edinburgh Encyclopædia.

[5] Ibid.

[6] Mémoires de l'Academie Royale des Sciences, Année 1743, p. 214; Amsterdam, 1748. See Larrey's Recueil de Mémoires de Chirurgie, p. 226, for two cases of amaurosis from viewing an eclipse of the sun.

[7] Medical Transactions of the College of Physicians, Vol. iv. p. 56; London, 1813.

SECTION VIII.—MUSCÆ VOLITANTES.[1]

Certain false visual sensations have been described under the name of *muscæ volitantes*. The name denotes that in general they bear a resemblance to flies moving through the air; but the objects to which they are more particularly compared by those who are the subjects of them, and the descriptions which are given of their figure, size, and degree of opacity, are widely different; as are also the pictorial representations which are made of them.

Muscæ volitantes seldom appear in the optic axis, but are generally to one or other side of it, or above it, or below. Hence it is that the individual observes them only by the bye; at first, he is led to suppose that some sooty filament, or particle of dust is clinging to his eyelids, which he endeavours to brush away with his hand; for a day or two, perhaps, the sensation does not trouble him, and then it returns; when he endeavours to examine with more exactness the form and appearance of what seems flitting before him, he finds from its obliquity that it is difficult to do so; and when he turns his eye, as if to fix it in the axis of vision, it seems suddenly to fly from before him. If it happens, however, to be situated more in the direction of the centre of the retina, the patient finds that he can bring it directly before him for examination, and that viewed upon a sheet of paper at the usual distance for distinct vision, it appears less in size, and more defined, than when he brings it upon a distant wall or carries it to the sky.

Those muscæ volitantes which are dark and opaque are in general not susceptible of any change of form, and are altogether of a more permanent character, than those which are semitransparent and colourless.

1. One set of muscæ volitantes present an appearance of minute, twisted, watery filaments, somewhat like spun glass. These are never single, but always in locks or parcels; they are most frequently observed in the morning, and will often disappear for hours, or for the whole day, if the patient forcibly shuts the lids, and thus presses the eyeballs. 2. Other muscæ volitantes appear as

minute lucid spots, or drops of dew, dancing in every direction through the air. 3. Another variety appears to consist of one or more twisted semitransparent tubes filled with globules. (*Fig.* 105.) From time to time, these tubes change their degree of curvature, and often disappear for several days at a time. They generally end, at least by one of their extremities, in a bulb, with many globules accumulated in it. Not unfrequently one portion of the tube seems to pass behind another. What appears, on a slight view, as merely a dim undefined spot, like a cloud or bit of cobweb, if more carefully examined by the patient, is generally found to resolve itself into an infinite number of globules, (*Fig.* 106.) or into threads twisted together, and filled with globules. (*Fig.* 107.) A

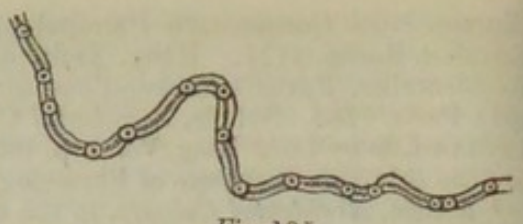

Fig. 105.

Fig. 106.

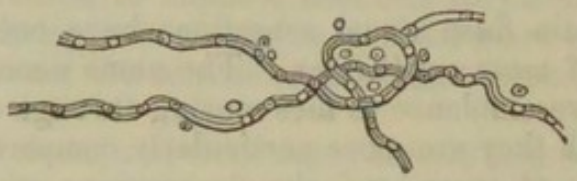

Fig. 107.

dark spot, with threads stretching from it in different directions, is an appearance not unfrequently complained of. Sometimes a few dark circular spots, with lucid centres, are all that is observed, and to these some patients give the name of *black stars.* They are perceived even with the eyes shut. 4. "The appearance I see," said an amaurotic patient to me, "is that of a dark wafer covering the middle of objects. It is getting broader and broader, for formerly I could read past the edge of it, but now I cannot." This is the worst kind of musca, affecting the fenestra lucida of the retina, and is essentially different from the others already enumerated, none of which occupy the centre of the field of vision.

It often happens, that various sorts of muscæ are observed by the same individual.

Patients are often persuaded that muscæ volitantes move, and will not readily be convinced that this is a deception. They will sometimes tell us, for instance, that when they raise their eyes rather quickly, the muscæ volitantes fly upwards, but if they fix their sight upon a cloud or other elevated object, that they descend slowly, as if towards the bottom of the eye; that they do not see them when they continue to look steadily at the same object; but that on the least motion of the eyes, the muscæ leave the situation which from their gravity they had assumed, and come again into view. Now, all these motions are merely apparent. If the cause of the muscæ volitantes lies below the optic axis, it will produce an impression as if it were placed above the level of the eye, inducing us to turn our eyes that way, expecting to bring it into the centre of the eye, that we may view it more distinctly; and in this case the

dark spots seem to fly upwards. Slowly, as the eyes descend, the muscæ again come into view. If the cause lies above the optic axis, we pursue it from the same motive, and it seems to move downwards. If the cause be placed much to one side of the optic axis, be it above or below, to the right or to the left, it is impossible to gain a deliberate view of the spectrum which it produces. It flies, as it were, before us, and as quickly returns again to annoy the eye, equally tired of its presence and of the ineffectual attempts made to examine it more at leisure. But if the cause be within a few degrees of the optic axis, no difficulty is experienced in obtaining a distinct view of the musca. The patient brings it at once on the paper, and with his pen delineates its form for the information of others.

In the mild light of evening, and in dull wintry weather, muscæ volitantes are scarcely or not at all visible. The patient can also generally read or write with candle-light without being troubled with them; they are most troublesome in broad day-light, or when the sun is shining.

The retina is often perfectly acute in its sensibility, except at the spots affected with muscæ volitantes, the pupil lively, and the eye of natural firmness. These false perceptions do not in general render objects obscure, as incipient cataract or amaurosis does. They are increased in number, however, by over-exertion of the sight or irritation of the brain. Although they often continue, after having once formed, unchanged through the rest of life, they sometimes go on increasing, and may reach such a degree that the patient compares his vision to looking through a riddle.

Muscæ volitantes sometimes affect only one eye, especially if the one is weaker than the other. They are seldom seen by those persons who enjoy perfect vision, almost all who suffer from them being myopic or presbyopic.

Proximate causes. Muscæ volitantes are never seen, in the sense that objects out of the eye are seen. Opaque spots, in any part of the eye anterior to the retina, could never produce an image on that membrane, sufficiently defined to give rise to such impressions as the generality of muscæ volitantes. Such spots might produce an obscurity of vision, by intercepting a certain number of the rays of light, exactly as specks on the cornea, depositions in the pupil, or incipient cataract does, or as any one may do by holding an opaque body, such as a common pin, across and close to his cornea; but no object within the eye, (nor indeed without the eye, unless beyond a certain distance from the cornea,[2]) can be brought to a focus on the retina, or produce any other impression than a degree of dimness. This, however, is evidently not at all the kind of impression produced in what we term muscæ volitantes. Even when these appearances are remote from the axis of vision, so that they cannot be dwelt upon, but are only glanced at, as if in passing, they are still too much defined, to be of the nature of mere dim shadows, arising from an interception of light.

I by no means deny that the branches of the arteria centralis

retinæ, which ramify through the hyaloid membrane, and end on the posterior hemisphere of the crystalline capsule, are capable of becoming varicose; that opaque depositions may take place in the vitreous humour or in the lens; or opaque corpuscules float in the aqueous humour; but as these cannot cause muscæ volitantes, this disease must be referred either to the retina itself, or to the choroid coat. The probability is, that both the semitransparent and the dark muscæ are generally owing to a dilated or varicose state of the branches of the arteria centralis retinæ, or corresponding vein, ramifying on the concave surface of the retina. It is possible, however, that in some instances, muscæ are the effects of certain portions of the retina having become insensible to light, either from the pressure of some irregular projecting point or points of the choroid, or from some other cause. We can conceive the nervous layer of the retina to be in one or in many exceedingly minute portions of its extent so altered by disease, or so pressed upon by the neighbouring parts in a morbid state, as to be no longer capable of being stimulated by light at the parts affected, each of which will necessarily give rise to the sensation of a musca volitans. Blood effused either by the vessels of the retina, or those of the choroid, is a likely cause of partial insensibility of the retina, and consequently of muscæ volitantes.

Remote causes. A very proper distinction has been made between those muscæ volitantes which appear to depend on plethora and sanguineous congestion, and those which are connected with atony and general weakness. The former are apt to follow or to be combined with photopsia, and may be caused by whatever produces an increased supply of blood to the head and eyes, or impedes its return. The latter are among the most frequent effects of disordered digestion, arising from want of exercise, improper diet, or a long continuance of any of the depressing passions.

A combination of causes frequently appears to operate in the production of muscæ volitantes; such as, over-use of the eyes, indulgence in spirituous liquors, and the like.

Prognosis. Few symptoms prove so alarming to persons of a nervous habit or constitution as muscæ volitantes. They immediately suppose that they are about to lose their sight, by cataract or amaurosis. We may safely assure them that there is no danger of either of these terminations, unless other symptoms be present.

The farther the muscæ are from the axis of vision, the less likely are they to become detrimental to vision.

Treatment. When this disease is evidently connected with sanguineous turgescence, there can be no doubt of the propriety of depletory treatment; such as, blood-letting, cupping, and the application of leeches. In by far the greater number of instances, however, an opposite plan requires to be followed, for in the weakly or nervous persons, who in nine cases out of ten form the subjects of muscæ volitantes, debilitating remedies will not only afford no assistance, but even aggravate the symptoms. The mind must be relieved as

much as possible from intense application of every kind, and the patient assured, not only of the absence of all danger to the sight, if the muscæ volitantes appear to be uncombined with other symptoms, but of the probability of these false perceptions becoming less and less troublesome, in proportion as the strength and spirits are recruited.

The state of the stomach and bowels must in every instance be attended to; as these are often faulty or sluggish in their action, and the secretion of bile morbid or defective. The patient must carefully avoid such articles of food or drink as induce acidity, flatulence, and the other signs of indigestion. Dr Cheyne mentions[3] a case in which the patient was cured by giving up the use of sugar. Purgatives will be found highly advantageous; and ought to be followed by a course of tonics, such as the precipitated carbonate of iron, the sulphate of quina, or the like. I have known a gentle course of mercury frequently to lessen, and sometimes altogether to remove muscæ volitantes. Valerian, and other anti-spasmodics are occasionally useful.

If the eyes have been weakened by the frequent discharge of tears, it will be useful to foment them with a tepid infusion of chamomile flowers, twice or thrice daily; and afterwards to touch the forehead, temples, and outside of the eyelids with *eau de Cologne*, or some similar application.

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[1] *Visus muscarum. Myodesopsia*, from μυῖα, *a fly*, and ὄψις, *vision*.

[2] Pitcarnii Theoria Morborum Oculi; Opera, p. 206; Lugduni Batavorum, 1737.

[3] Cases of Apoplexy and Lethargy, p. 154; London, 1812.

SECTION IX.—SPECTRAL ILLUSIONS.

The phenomena falling under this head may be referred, in one set of cases, merely to the insensibility of the eye to direct impressions of very faint light; while another set must be regarded as symptoms of disorder in the eye, or in the part of the brain connected with the optic apparatus.

I. Sir David Brewster observes, that when the eye is steadily directed to objects illuminated by a feeble gleam of light, it is thrown into a state nearly as painful as that which is produced by an excess of light. A kind of remission takes place in the conveyance of the impressions; the object actually disappears, and the eye is agitated by the recurrence of impressions which are too feeble for the performance of its functions.

These facts "may serve to explain" says Sir David, "some of those phenomena of the disappearance and reappearance of objects, and of the change of shape of inanimate objects which have been ascribed by the vulgar to supernatural causes, and by philosophers

to the activity of the imagination. If in a dark night, for example, we unexpectedly obtain a glimpse of any object, either in motion or at rest, we are naturally anxious to ascertain what it is, and our curiosity calls forth all our powers of vision. This anxiety, however, serves only to baffle us in our attempts. Excited by a feeble illumination, the retina is not capable of affording a permanent vision of the object, and while we are straining our eyes to discover its nature, it will entirely disappear, and afterwards reappear and vanish alternately."[1]

II. It is well known that certain spectral illusions attend *delirium tremens* or *mania à potu*. The patient supposes his chamber to be haunted by cats, snakes, and various other spectres, and often calls for assistance to drive them away. He imagines vermin to be crawling over his bed, and endeavours to pick them off; or frequently puts out his hand, as if to catch something floating in the air before him.

III. Spectres, or resemblances of natural objects, often present themselves, as it were to the eye, in cases where the light is sufficient, and the state of general health unimpaired. We are highly indebted to Dr Ferrier,[2] of Manchester, for the light he has thrown on this class of spectral illusions. Admitting the reality of spectral impressions, occurring without any sensible external agency, he has with great ingenuity explained the general law of the system to which the origin of such impressions may be referred, namely, the renewal of actual impressions formerly made on the sensorium, and has applied this principle to the explanation of visions and apparitions. The subject has been farther pursued by Dr Hibbert, in his *Sketches of the Philosophy of Apparitions*. He traces this class of phenomena to a great variety of causes; as, highly-excited states of particular temperaments, hysteria, hypochondriasis, the neglect of accustomed periodical blood-letting, febrile and inflammatory affections, inflammation of the brain, &c.

The spectral illusions described by those troubled with the disease, which produces such false impressions, are infinitely various; sometimes bearing the appearance of a single person or other object, and in the other cases, imitating the impression which might be produced by crowds of human beings moving before the spectator, or by scenes of endless diversity. Many patients affected with visions, are unable to distinguish them from real impressions, and call upon the spectators to look at the objects of their terror or surprise; others, though they can scarcely persuade themselves that the impressions under which they labour do not arise from real objects, feel a degree of diffidence in announcing what they see to the bystanders, whose society they sometimes seek only in order to dissipate the intruders; while a third set are perfectly conscious from first to last that they are labouring under a disease, which renders them the subjects of false perceptions. The fact, that spectral illusions, in some instances, have been attended by fatal effects, is particularly mentioned by Hippocrates.[3]

Treatment. The beneficial effect of sleep, procured by opium, in banishing the phantasms of those labouring under *delirium tremens*, is well known. Other sorts of remedies will be required in other cases, and will sometimes operate in a manner almost equally striking. Witness the effects of depletion, in the celebrated case of Nicolai, the Berlin bookseller, who, for nearly two months, was constantly affected with spectral illusions.

"Though at this time" says he, "I enjoyed rather a good state of health both in body and mind, and had become so very familiar with these phantasms, that at last they did not excite the least disagreeable emotion, but on the contrary afforded me frequent subjects for amusement and mirth; yet as the disorder sensibly increased, and the figures appeared to me for whole days together, and even during the night, if I happened to wake, I had recourse to several medicines, and was at last again obliged to have recourse to the application of leeches to the anus.

"This was performed on the 20th of April, at eleven o'clock in the forenoon. I was alone with the surgeon, but during the operation, the room swarmed with human forms of every description, which crowded fast one on another; this continued till half-past four o'clock, exactly the time when the digestion commences. I then observed that the figures began to move more slowly; soon afterwards the colours became gradually paler; every seven minutes they lost more and more of their intensity, without any alteration in the distinct figure of the apparitions. At about half-past six o'clock, all the figures were entirely white, and moved very little; yet the forms appeared perfectly distinct; by degrees they became visibly less plain, without decreasing in number, as had often formerly been the case. The figures did not move off, neither did they vanish, which also had usually happened on other occasions. In this instance they dissolved immediately into air; of some, even whole pieces remained for a length of time, which also by degrees were lost to the eye. At about eight o'clock, there did not remain a vestige of any of them, and I have never since experienced any appearance of the same kind. Twice or thrice since that time, I have felt a propensity, if I may be so allowed to express myself, or a sensation, as if I saw something, which in a moment again was gone."[4]

Even a change in the position of the body, such as may possibly modify the state of the circulation through the brain, has sometimes been known to dissipate the phantasms produced by disordered sensation. "I know a gentleman" says an anonymous writer on this subject, "at present in the prime of life, who, in my opinion, is not exceeded by any one, in acquired knowledge, and originality of deep research; and who, for nine months in succession, was always visited by a figure of the same man, threatening to destroy him, at the time of going to rest. It appeared upon his lying down, and instantly disappeared when he resumed the erect posture."[5]

It must prove highly beneficial to those who labour under such

disordered sensations, to be made acquainted with the fact, that they are merely the subjects of a peculiar disease of the internal optic apparatus, the effect of which is to produce a repetition or imitation of former impressions. By this means the minds of those may be calmed, who otherwise might be led to ascribe their visions to supernatural powers, or who through fear or terror might be driven to insanity.[6]

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[1] Edinburgh Journal of Science, Vol. iii. p. 209; Edinburgh, 1825.
[2] Essay towards a Theory of Apparitions; London, 1813.
[3] De Virginum Morbis.
[4] Nicolai's Memoir, in Nicholson's Journal, Vol. vi. p. 161; London, 1803.
[5] Nicholson's Journal, Vol. xv. p. 289; London, 1806.
[6] The reader who wishes to pursue the subject of *Spectral Illusions*, in addition to the works already referred to, may consult the following. Cardanus de Vita Propria. Alderson, in Edinburgh Medical and Surgical Journal; Vol. vi. Armstrong, in Ibid; Vol. ix. Burton Pearson, in Ibid. Simpson, in Phrenological Journal, No. 6. Edinburgh Journal of Science for April, 1830. Streeten, in Midland Medical and Surgical Reporter; Vol. ii. Sutton's Tracts on Delirium Tremens, &c. Scott on Demonology and Witchcraft, p. 16; London, 1830. Brewster on Natural Magic, p. 37; London, 1832. Craig and Craigie, in Edinburgh Medical and Surgical Journal, Vol. xlvi. pp. 334, 353.

SECTION X.—NIGHT-BLINDNESS.[1]

Case 280.—As the servant to a corn-miller was employed, one evening near sunset, in mending some sacks, he felt himself suddenly deprived of the use of his limbs, and of his sight. At the time he was attacked by this uncommon disease, he was not only entirely free from any pain in his head or limbs, but had even a sensation of ease and pleasure; he was, as he expressed himself, as if in a pleasing doze, but perfectly sensible. He was immediately carried to bed, and watched till midnight; at which time he desired those who attended him, to leave him, because he was neither sick nor in pain. He continued the whole night totally blind, and without a wink of sleep. When the daylight of the next morning appeared, his sight returned to him gradually, as the light of the sun increased, till it became as perfect as ever. When he rose from his bed, he found his limbs restored to their usual strength and usefulness, and himself in perfect health.

But on the evening of the same day, about sunset, he began to see but obscurely, his sight gradually departed from him, and he became as blind as on the preceding night; though his limbs continued as well as in perfect health, nor had he from the first night any farther complaint from that quarter. Next day, with the rising sun, his sight returned; and this was the almost constant course of the disease, for two months.

The symptoms, which, from the second night, constantly preceded the blindness, were a slight pain over the eyes, and a noise in his head. That he was totally blind every night, when these symptoms appeared, was evident, from his not being able to see the light of a candle, though held close to his eyes; and that in the day his sight was perfect, was as manifest, from his being capable of reading the smallest print, and threading the finest needle.

The first day that Dr Pye saw this patient, he found his eyes perfectly natural, but some time after he observed the pupils, during one of the nocturnal paroxysms, to be enlarged about one-third in diameter. After nearly two months' continuance of the disease, it began to be less regular in its occurrence, the patient retaining his sight for a single night or for several nights together, and then the blind-

ness recurring. Dr Pye put him at last on the use of cinchona, and thought it successful in removing the complaint. It must be observed, however, that the patient, while taking the cinchona, laboured under a spontaneous diarrhœa, in consequence of which he became gradually weaker and weaker. His sight he retained from the first day after using the medicine, but ten days after, he became delirious, and deprived of hearing, and, in five days more, he died.[2]

I have quoted this case, as a good example of night-blindness, a disease which though rare in this country, is by no means uncommon in warm climates, and to which seamen appear to be particularly exposed.

Symptoms. The first attack of the disease generally excites great alarm. The patient is busy perhaps at his occupation, or enjoying himself in the midst of his family, when suddenly he finds his sight fail, and as evening advances becomes almost completely blind. The medical attendant is immediately sent for, and is often as much amazed, and little less alarmed than the patient. He probably finds the pupils dilated, but no vertigo, pain, nor other sign indicative of any serious affection of the head. He perhaps takes away blood, orders some purgative medicine, and pronounces a very unfavourable prognosis. To the joy of all concerned, the patient wakes in the morning with his sight perfectly restored.

But again on the approach of evening, symptoms are perceived of returning blindness. Objects appear as if covered by a bluish or greyish mist, and in the course of a few minutes the patient is obliged to grope his way like a blind man. Candles are brought. If he perceives that they are present, they appear as if glimmering through a fog, and scarcely ever enable him to see with distinctness. The effect, however, of artificial light is not uniformly the same in this disease. Sometimes, the patient has recourse to a trial of various sorts of glasses, but without avail.

Night after night, the blindness returns, and becomes more and more complete. For a time, the restoration to vision through the day appears to be tolerably perfect, but at length the sight is evidently weak by day as well as by night. The patient is affected with photophobia, and becomes near-sighted; his vision is more and more impaired; and, if neglected or mistreated, the disease ends in incurable amaurosis.

It sometimes happens, in incipient cases of night-blindness, that the patient, though unable to distinguish even large objects after sunset or by moonlight, is restored to a tolerable degree of sight by the use of candle-light; but in cases fully developed, even strong artificial illumination is unable to affect in any degree the sunken sensibility of the retina.

The appearances of the eyes are different in different cases. In many, there is scarcely any change from the appearances of perfect health. Generally, however, the pupils are dilated during the attack, and do not contract on exposing the eyes to the light of a candle or of the moon. In some, the pupils continue dilated even during the day; in others, they are contracted, and evince a painful irritability on exposure to strong light. If the patient happens to

look at the direct rays of the sun, especially of a tropical sun, or a strong glaring reflection of them, as from the sea, pain and temporary blindness are induced, from which he recovers by closing his eyes for a time, and retiring into the shade.

Night-blindness does not appear to be necessarily accompanied by any constitutional symptoms. That such symptoms are occasionally present, is evident from the case already quoted, and that a variety of them may attend in other instances, will appear extremely probable from a consideration of the remote causes of the disease.

Night-blindness became epidemic in two battalions of the 19th Prussian regiment of the line, quartered at Ehrenbreitstein and Pfaffendorf, in July and August, 1834, and attacked, in all, 138 soldiers. When the disease first broke out, those affected were thought to be malingering, but a close examination of the symptoms, and the further spreading of the malady, proved the incorrectness of this suspicion. Those who suffered were unable to find their muskets, if they for a moment laid them out of their hands at night, and they experienced so much difficulty in distinguishing even near objects in the dark, that when they were posted as sentinels, they feared to pace up and down, lest they might not be able to find their sentry-box again. When ordered to march or perform any military evolution during the night, they were constantly stumbling, and knocking against each other, in a manner that could be accounted for only by a defect of vision. In none did the general health appear in the least deranged, and in none could any morbid alteration be detected in the eye. The only thing complained of was a dimness of vision, as the twilight of evening came on, and which increased as the night advanced. This dimness the patients compared to that caused by a film spread over the eye.

Surgeon-general Hübner investigated this singular epidemic with great attention, and attributed its origin to the following causes :— 1. The great heat of the summer. 2. The fatigue experienced by the soldiers in the frequent ascent of the steep heights of Ehrenbreitstein and Pfaffendorf, a fatigue the more sensibly felt on account of their being all natives of Posen, a flat and level country. 3. The frequency of their exercises and parades, on an unshaded and dazzling sandy soil, where also they were exposed to the reflection of the sun's rays from the surface of the Rhine. 4. The extreme darkness of their rooms, which rendered their eyes more sensible when they went out on duty, or for pleasure. The second and fourth causes were probably the most efficient, for two other companies of the same battalions, quartered in the neighbouring valley of Ehrenbreitstein, entirely escaped the disease. Their barrack-rooms were large and well lighted, compared with the small dark apartments in the fortifications, where the companies affected with the disease were lodged.

The treatment was very simple, and consisted in removing those affected to an hospital in other quarters, where they were no

longer exposed to the operation of the exciting causes, and in the application generally and topically of cooling remedies, calculated to diminish congestion. To effect this, cold lotions, frequently applied, low diet, and rest, were sufficient. In the space of four weeks they had all recovered, and were enabled to resume their duty. There were no relapses, a fact accounted for, by the diminished intensity of the exciting causes during the month of September.[3]

Prognosis. The duration of the disease, when it is left to itself, has been found to vary from one night to nine months. Its general period of continuance appears to be from two to three months. Sometimes it occurs in a chronic form, lasting for years, or for life.

Mr Bampfield states[4] that of more than a hundred cases of idiopathic, and two hundred of symptomatic night-blindness, which had occurred in his practice, in different parts of the globe, but chiefly in the East Indies, all perfectly recovered. Hence he infers that, under proper treatment, the prognosis may be always favourable.

Europeans who have once been affected with night-blindness, in the East or West Indies, are particularly liable to a recurrence of the disease, so long as they remain in a tropical climate. Those who have suffered from it at some previous time, are also apt to be occasionally attacked with dimness of sight during short periods for some nights together, or with merely momentary night-blindness.

Proximate Cause. This periodic amaurosis probably depends on some peculiar state of the retina, rendering the eye insensible except to light of a certain degree of intensity; but of the nature of that peculiar state it is impossible for us to form any rational hypothesis. On dissecting the eye of a deaf and dumb person, congenitally affected with night-blindness, I saw numerous black spots in the substance of the retina, corresponding much to the description given[5] by Walther, of the appearances found by him in the eye of a man who had lost his sight a year before. In some cases, there is reason to suspect that the proximate cause does not affect the eye, but the brain.

Remote Causes. 1. Incomplete night-blindness is not unfrequently congenital.

2. Scarpa is of opinion that night-blindness is most frequently sympathetic of disorder of the stomach. When this is the case, the tongue is foul, the breath fœtid, and the appetite deficient.

3. Suppressed perspiration, owing to the coldness of the night-air, has been mentioned as a probable cause.

4. Exposure to an unusual glare of light has been known to induce night-blindness, even in this country; and in warm climates, this cause frequently operates in its production. Fatigue and want of sleep appear to act as causes among the Russian peasantry, at a season when the eye is exposed with little intermission to the constant action of the light, the sun in the end of June and during July, (their hay harvest,) dipping but very little below the horizon, and that only for a short time. Insolation, and in particular sleeping with

the face or head exposed to the rays of the sun, or to a very strong light, have been particularly mentioned as causes.

5. A residence on board ship seems of itself to conduce to the disease.

6. Some authors have considered night-blindness as a symptom, or as a precursor of scurvy. Subsistence upon sea-diet perhaps favours the one, as it certainly induces the other.

7. It is a popular notion in the East Indies, that the eating of hot rice brings on night-blindness.

Treatment. 1. If there are signs of deranged digestion, an emetic is certainly indicated; after which the bowels are to be cleared out by laxative clysters, and the use of purgatives.

2. The Russian peasants are said to cure this disease, in a week, or 14 days at most, by drinking a decoction or infusion of the centaurea cyanus, without sweetening. Probably other bitter infusions might answer as well.

3. A succession of blisters to the temples, tolerably close to the external canthus of the eye, has been strongly recommended by Mr Bampfield. He states that under their application, the retina appears to regain its sensibility, in the same gradual manner as it had been deprived of it; that the first blister commonly enables the patient to see dimly by candle-light, or to perceive objects without being able to discriminate what they are; that in some slight cases, the first blister effects a cure; that the second blister commonly enables the patient to see distinctly by candle-light, perhaps by bright moon-light, or even half an hour after sunset, or that the disease intermits for short periods during the night; and that a perfect recovery is often effected by the second blister. When this does not happen, a third, fourth, or fifth is to be applied; and if the disease still continues in any considerable degree, a perpetual blister is to be formed on each temple, and maintained till a cure is accomplished, which generally takes place within a fortnight.

4. If the night-blindness is attended with symptoms of scurvy, the use of blisters should be deferred, until the scorbutic disposition is corrected, by proper diet and medicines; not only because well-founded apprehensions ought to be entertained of a scorbutic ulcer forming on the blistered parts, but because the night-blindness gradually yields, as the cure of the scurvy proceeds. Mr Bampfield, however, reckons, that about a third of the cases of scorbutic night-blindness resist the antiscorbutic regimen and remedies, and require to be treated ultimately as idiopathic cases.

5. A shade should be worn over the eyes, both during the treatment, and for some time after the cure, to defend them from the painful irritation occasioned by exposure to vivid lights.

6. The eyes ought to be bathed three or four times a-day with cold water.

7. Should the above plan of treatment not prove successful, and if there is no suspicion of the disease being attended with any tendency to sanguineous congestion in the head, cinchona may be tried.

8. Electricity, as a topical stimulus to the eye, has sometimes been employed with success. Also, exposing the eyes to the vapour of ammonia, every three or four hours.

9. In apoplectic cases, general and local depletion will of course take precedence of all other remedies.

10. A residence on shore, and a return to Europe, are to be recommended in obstinate cases on board ship, or in the warm latitudes. These are also often the only means of preventing relapses, in those who have already repeatedly suffered from night-blindness.

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[1] *Nyctalopia* of some, and *hemeralopia* of others, terms which it were better altogether to avoid. Nyctalopia more especially has been used to signify both *seeing by night*, and *night-blindness*. Sometimes even the same author uses the word in both these opposite meanings. It seems doubtful whether it is a compound of νὺξ and ὤψ merely, or of νὺξ, α privative, and ὤψ; and a similar doubt hangs over *hemeralopia*.

[2] Medical Observations and Inquiries, Vol. i. p. 111; London, 1763.

[3] Quoted from the Medicinische Zeitung, in the Dublin Journal of Medical and Chemical Science, Vol. viii. p. 123.

[4] Medico-Chirurgical Transactions, Vol. v. p. 47; London, 1814.

[5] Abhandlungen aus dem Gebiete der practischen Medicin, Vol. i. p. 41; Landshut, 1810.

SECTION XI.—DAY-BLINDNESS.[1]

Although *day-blindness* is enumerated by all systematic authors on the diseases of the eye, very little has been recorded on the subject from actual observation. Scrofulous intolerance of light, the photophobia of the albino, or the blindness of the captives of Dionysius, long shut up in the dark and suddenly brought out into the glare of day,[2] must not be confounded with a periodical *amaurosis*, the counterpart of that which we have last considered. Day-blindness is mentioned as a symptom both of mydriasis and myosis. In the former disease, the pupil admits too much light to enable the patient to see till after sunset. In the latter, the contraction of the pupil is supposed to relax in the obscurity of the night, and the vision in this way to improve. On the same principle, the patient affected with incipient cataract sees little during the brightness of the day, but finds his sight in part restored by the dilatation of the pupil, which takes place in the evening.

Among the few original observations tending to establish the fact of there being such a disease as a periodic amaurosis, which makes its attack through the day, and departs at night, may be quoted the following from Ramazzini.

"I have repeatedly observed," says he, "among our country people, and especially in boys, a thing sufficiently strange. In March, about the equinox, boys about ten years of age were affected with a great degree of weakness of sight, so that through the whole day they saw little or nothing, and wandered about the fields like

blind people; but when night came they saw again distinctly. This affection ceased without any remedy, and by the middle of April, the patients were completely restored to sight. I frequently observed the eyes of these boys, and found the pupils much enlarged."[3]

A gentleman related to Dr Guthrie that he had witnessed the following example of day-blindness. Whilst in garrison in Landau, in Alsace, in the summer of 1772, two hundred men of the regiment of Picardie, were seized with a species of blindness during the meridian splendour of the sun, and could not see their way when it was not overcast, insomuch that when they had strolled out into the fields during a cloudy day, if the sun suddenly shone out, they were absolutely obliged to be led by their companions till a cloud once more obscured the solar light, and enabled them to pursue their course.[4]

These instances look like an endemic or epidemic day-blindness; but are evidently too vague to furnish grounds for any general conclusions.

Baron Larrey has recorded a remarkable case of sporadic day-blindness, occurring in an old man, one of the galley-slaves at Brest, who had for thirty-three years been shut up in a subterraneous dungeon. His long residence in darkness had had such an effect on the organs of vision, that he could see only under the shade of night, and was completely blind during the day.[5]

Another case, connected with a venereal taint, and cured by mercurial frictions, is related by Mr Isbell.[6]

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[1] *Hemeralopia* of some; *nyctalopia* of others. See note 1 of the preceding section.

[2] Galenus de Usu Partium, Lib. x. Cap. 3.

[3] De Morbis Artificum, cap. xxxviii; Opera, p. 363; Londini, 1718.

[4] Duncan's Medical Commentaries, Vol. xix. p. 290; Edinburgh, 1795.

[5] Mémoires de Chirurgie Militaire, Tome i. p. 6; Paris, 1812.

[6] Edinburgh Medical and Surgical Journal, Vol. ix. p. 269; Edinburgh, 1813.

SECTION XII.—HEMIOPIA.[1]

The term *hemiopia* has been used to signify a partial blindness obscuring about a half of the field of vision. Very frequently it is the right half, or the left half of all objects, which appears dark, and that whether they are regarded with one eye only, or with both. In other cases, only one eye is affected. It is necessary also to observe, that the upper or the lower half of the field of vision may appear dark, or that the patient, looking directly forwards, may see tolerably well within a certain angle, but nothing to either side. These latter varieties of hemiopia are less common than that in which the right or the left half of each retina appears to be insensible to light, but are not less worthy of attention.

It would appear from the histories of hemiopia on record, that it

is apt to be sudden in its attack, and to recur at considerable intervals of time.

Dr Wollaston, a few years before his death, was the means of directing considerable attention to this disease, by his paper *On Semi-decussation of the Optic Nerves*, published in the Philosophical Transactions. He had been twice attacked by hemiopia, and had occasionally met with it in others.

"It is now more than twenty years," says he, "since I was first attacked with the peculiar state of vision to which I allude, in consequence of violent exercise I had taken for two or three hours before. I suddenly found that I could see but half the face of a man whom I met; and it was the same with respect to every object I looked at. In attempting to read the name JOHNSON, over a door, I saw only SON; the commencement of the name being wholly obliterated to my view. In this instance the loss of sight was toward my left, and was the same whether I looked with the right eye or the left. This blindness was not so complete as to amount to absolute blackness, but was a shaded darkness without definite outline. The complaint was of short duration, and in about a quarter of an hour might be said to be wholly gone, having receded with a gradual motion from the centre of vision obliquely upwards towards the left.

"Since this defect arose from over-fatigue, a cause common to many other nervous affections, I saw no reason to apprehend any return of it, and it passed away without any need of remedy, without any farther explanation, and without my drawing any useful inference from it.

"It is now about 15 months since a similar affection occurred again to myself, without my being able to assign any cause whatever, or to connect it with any previous or subsequent indisposition. The blindness was first observed, as before, in looking at the face of a person I met, whose *left* eye was to my sight obliterated. My blindness was in this instance the reverse of the former, being to *my right* (instead of the left) of the spot to which my eyes were directed; so that I have no reason to suppose it in any manner connected with the former affection.

"The new punctum cæcum was situated alike in both eyes, and at an angle of about three degrees from the centre; for when any object was viewed at the distance of about five yards, the point not seen was about ten inches distant from the point actually looked at.

"On this occasion the affection, after having lasted with little alteration for about 20 minutes, was removed suddenly and entirely by the excitement of agreeable news respecting the safe arrival of a friend from a very hazardous enterprise."[2]

In consequence of reflecting on these attacks of hemiopia, Dr Wollaston was led to adopt the following hypothesis regarding the arrangement of the optic nerves, the hypothesis, in fact, of Sir Isaac Newton.[3]

"Since the corresponding points of the two eyes," says he,

"sympathize in disease, their sympathy is evidently from structure, not from mere habit of feeling together, as might be inferred, if reference were had to the reception of ordinary impressions alone. Any two corresponding points must be supplied with a pair of filaments from the same nerve, and the seat of a disease in which similar parts of both eyes are affected, must be considered as situated at a distance from the eyes at some place in the course of the nerves where these filaments are still united, and probably in one or the other thalamus nervorum opticorum.

"It is plain that the cord, which comes finally to either eye under the name of optic nerve, must be regarded as consisting of two portions, one half from the right thalamus, and the other from the left thalamus nervorum opticorum.[4]

"According to this supposition, decussation will take place only between the adjacent halves of the two nerves. That portion of nerve which proceeds from the right thalamus to the right side of the right eye, passes to its destination without interference; and in a similar manner the left thalamus will supply the left side of the left eye with one part of its fibres while the remaining halves of both nerves in passing over to the eyes of the opposite sides must intersect each other, either with or without intermixture of their fibres.

"Now, if we consider rightly the facts discovered by comparative anatomy in fishes, we shall find that the crossing of the entire nerves in them to the opposite eyes, is in perfect conformity to this view of the arrangement of the human optic nerves. The relative position of the eyes to each other in the sturgeon, is so exactly back to back, on opposite sides of the head, that they can hardly see the same object, they can have no points which generally receive the same impressions as in us; there are no corresponding points of vision requiring to be supplied with fibres from the same nerve. The eye which sees to the left has its retina solely upon its right side; and this is supplied with an optic nerve arising wholly from the right thalamus; while the left thalamus sends its fibres entirely to the left side of the right eye for the perception of objects situated on the right. In this animal an injury to the left thalamus might be expected to occasion entire blindness of the right eye alone, and want of perception of objects placed on that side. In ourselves, a similar injury to the left thalamus would occasion blindness (as before) to all objects situated to our right, owing to insensibility of the left half of the retina of both eyes."

Having thus explained his hypothesis, Dr Wollaston goes on to relate the following additional instance of hemiopia.

"A disorder" says he, "that has occurred within my own knowledge in the case of a friend, seems fully to confirm this reasoning, as far as a single instance can be depended upon. After he had suffered severe pain in his head for some days, about the left temple, and toward the back of the left eye, his vision became considerably impaired, attended with other symptoms indicating a slight compression on the brain.

"It was not till after the lapse of three or four weeks that I saw him, and found that, in addition to other affections which need not here be enumerated, he laboured under a defect of sight similar to those which had happened to myself but more extensive, and it has unfortunately been far more permanent. In this case the blindness was at that time, and still is entire, with reference to all objects situated to the right of his centre of view. Fortunately, the field of his vision is sufficient for writing perfectly. He sees what he writes, and the pen with which he writes, but not the hand that moves the pen. This affection is, as far as can be observed, the same in both eyes, and consists in an insensibility of the retina on the left side of each eye. It seems most probable, that some effusion took place at the time of the original pain on that side of the head, and has left a permanent compression on the left thalamus. This partial blindness has now lasted so long without sensible amendment, as to make it very doubtful when my friend may recover the complete perception of objects on that side of him."

Towards the conclusion of his paper, Dr Wollaston adds the following notice of another case of this disease.

"One of my friends" says he, "has been habitually subject to it for sixteen or seventeen years, whenever his stomach is in any considerable degree deranged. In him the blindness has been invariably to his right of the centre of vision, and, from want of due consideration, had been considered as temporary insensibility of the right eye; but he is now satisfied that this is not really the case, but that both eyes have been similarly affected with half-blindness. This symptom of his indigestion usually lasts about a quarter of an hour or 20 minutes, and then subsides, without leaving any permanent imperfection of sight."

Dr Wollaston died about four years after the publication of the paper, from which these extracts are taken. Whether he had any third attack of hemiopia, I know not; but in the account which has been published of the appearances observed on inspecting his body, we find it stated, that the optic thalamus of the right side was of an unusually large size, and that on making a section of it, little or no vestige of its natural substance was perceptible, with the exception of a layer of medullary substance on its upper part. It had been converted into a tumour, as large as a middle-sized hen's egg, towards the circumference of a greyish colour, and harder than the brain itself, somewhat of a caseous consistence, but in the centre of a brown colour, soft, and in a half-dissolved state. This diseased structure was not confined to the thalamus, but extended to the neighbouring portion of the corpus striatum. The right optic nerve, where it passes on the outside of the thalamus, was of a brown colour, more expanded, and softer than natural.[5]

The reader will readily perceive, that between this state of the brain, and the previous symptoms of hemiopia, there may or may not have been a connexion; for there were two distinct attacks of the disease, at the interval of twenty years, each attack subsiding

entirely after fifteen or twenty minutes, in the first attack objects to the left appearing dark, and in the second, those to the right. We know that morbid alterations in the substance of the brain often produce periodic diseases, and that certain additional causes of excitement operating upon an unsound brain, one or other of the functions of that organ are for a time impeded, till the new cause ceases to operate, when the individual immediately returns to his former state of apparent health.

The following remarks have occurred to me, in reflecting on Dr Wollaston's paper.

1. The notion of a semi-decussation of the optic nerves had not merely been entertained by several distinguished authors,[6] before Dr Wollaston, but had in some measure been demonstrated by dissection.[7] Even the idea that the two portions, of which each optic nerve may be regarded as consisting, remain distinct, after they form the retina, appears to belong to Sir Isaac Newton. It is supported, however, by Dr Wollaston, by an argument which is new, and probably without foundation; namely, that any two corresponding points of the two retinæ must be supplied with filaments either from the right or from the left optic nerve, and that upon this depends their correspondence. Dr Wollaston appears to have overlooked the fact, that as the optic nerves pass through the sclerotica and choroid considerably nearer the middle line of the body than the centre of the globe of each eye, the two optic axes, which, if any two points deserve to be considered as such, are surely corresponding points, will not be formed by filaments from the same nerve, but from opposite nerves. It has always occurred to me as more probable, that the two portions, of which each optic nerve consists, mingle their fibres, and then expand into the retina, so that the membrane in each eye should be regarded as a plexus, every point of which contains fibres derived from each side of the brain.

2. It is not, however, by mere reasoning upon a subject like this, that we can arrive at any sound conclusion. By far the greater part of the mass of facts, in pathological and in what may be called experimental anatomy, touching this question, go to prove, that injuries and diseases affecting one side of the brain, instead of hemiopia in both eyes, produce amaurosis only in the opposite eye.[8] The fact, also, which has been already mentioned in the beginning of this section, that we meet with a horizontal as well as a perpendicular hemiopia, appears scarcely reconcileable to the hypothesis of Dr Wollaston. Not so, however, that other variety of the disease, in which objects to each hand appear dark, and those only which are placed in front are seen distinctly; for were any tumour or excrescence to press on the anterior edge of the chiasma of the optic nerves, the effect would be, according to the hypothesis of semi-decussation, to paralyze the inner half only of each retina. I had under my care a patient with amaurosis of the inner half of each retina, attended with total loss of the sense of smell, and an imperfect sense of taste. He presented no other signs of cerebral

disease, and I thought it probable that the imperfection in taste was owing to the loss of the power of smell, and that this, along with the hemiopia, was owing to some pressure on the optic nerves, immediately anterior to their union, and on the olfactory nerves.

Treatment. Hemiopia, being merely a peculiar variety of amaurosis, must be treated on similar principles. The patient's constitution, whether plethoric or debilitated, the state of his digestive organs, the presence or absence of cerebral symptoms, as headach, vertigo, &c. must be taken into account, and guide us in the choice of remedies.[9]

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[1] From ἥμισυς *half*, and ὄψις *vision*. *Visus dimidiatus*.

[2] Philosophical Transactions for 1824 ; Part i. p. 224.

[3] Query 15th, at the end of the Opticks.

[4] The origin of the optic nerves is now generally acknowledged to be, not in the parts called *thalami nervorum opticorum*, as Dr Wollaston appears to have believed, but in the *corpora quadrigemina*, parts analogous to the optic lobes of birds, reptiles, and fishes.

[5] London Medical Gazette, Vol. iii. p. 293 ; London, 1829.

[6] Newton, Vater, Ackermann, Vicq-d'Azyr, Caldani, Cuvier, &c.

[7] Josephus et Carolus Wenzel de Penitiori Structura Cerebri, pp. 109, 333 ; Tab. vi. fig. 1 ; Tubingæ, 1812.

[8] Serres, Anatomie Comparée du Cerveau, Tome i. p. 331 ; Paris, 1827.

[9] On the subject of hemiopia, the reader may consult Arago, Annales de Chimie, Tome xxvii. p. 109. Crawford, London Medical and Physical Journal, Vol. liii. p. 48. Pravaz, Archives Générales de Médecine, Tome viii. p. 59 ; Tome ix. p. 485.

SECTION XIII.—AMBLYOPIA,[1] OR WEAKNESS OF SIGHT.

To some it may appear improper, to say any thing under this head, as it is well known that there is no specific disease to which the name *amblyopia* is appropriated, and that *weakness of sight* is a complaint symptomatic of many and very different kinds of disease. The oculist will find, that many of those cases which come before him under the name of weakness of sight, have existed for a long period, and withstood a variety of remedies, because they have never been carefully investigated, or accurately discriminated. Lingering ophthalmia, perhaps catarrhal, perhaps scrofulous, chronic iritis or retinitis, photophobia, nebulous cornea, incipient cataract, ophthalmia tarsi, epiphora from disordered stomach, slight blenorrhœa of the lacrymal passages, an inverted eyelash, myopia, presbyopia, photopsia, muscæ volitantes, incipient amaurosis, and many other affections of the organ of vision, from carelessness, or ignorance, are often set down as *weakness of sight*. Nay, treatises have been written on weakness of sight, and the proximate cause of what is merely a symptom of many and various diseases has been gravely investigated; modes of treatment have been proposed for weakness

of sight, and empirical cures have sometimes happened, equally surprising to the patient and the practitioner.

Amaurotic amblyopia is a very frequent disease. Among other means of relief, may be mentioned the use of coloured glasses. Those of a neutral tint, as it is termed, are the most agreeable to the eye.

[1] From ἀμβλὺς *dull*, and ὤψ *eye*. The term appears to be employed by Hippocrates, to signify impaired vision, unattended by any appearance of opacity in the eye.

CHAPTER XXIII.

DISEASES OF THE FIFTH NERVE, AFFECTING THE ORGAN OF VISION.

SECTION I.—NEURALGIA, OR TIC DOULOUREUX, OF THE FIFTH NERVE. HEMICRANIA.

§ 1. *Neuralgia.*

The branches of the first and second divisions of the fifth nerve, distributed to the eye, eyelids, and circumorbital region, are more frequently the seat of severe pain than any other nerves of the body. We meet, in the *first* place, with cases, in which these nerves are affected with paroxysms of pain, without any other signs of disease being present. In the *second* place, these nerves are affected with pain, when the sclerotica and iris are inflamed. (See pages 439, 453.) In a *third* set of cases, the teeth are decayed, the lenses glaucomatous, the external vessels of the eyes varicose, and vision impaired. In a *fourth* set, there is a cicatrice of the eyebrow, or other part, marking the seat of an injury which had probably implicated some of the branches of the fifth nerve. In a *fifth* set, there are attendant on the pain of the nerves, unequivocal signs of organic disease within the cranium. To the *first*, *fourth*, and *fifth* of these sets of cases, the names neuralgia and tic douloureux are generally applied. The *second* and *third* sets, are commonly accounted rheumatic, or arthritic.

Varieties. I am disposed to admit four varieties of circumorbital neuralgia; but the distinction is in a considerable degree empirical.

1. We have *simple* neuralgia, felt chiefly as if in the ultimate ramifications of the fifth pair, affecting individuals in every other respect perfectly healthy and robust, arising apparently from the

influence of cold, easily curable by precipitated carbonate of iron, and not liable to return.

2. *Remittent* or *intermittent* neuralgia is generally more extended and more severe than the former, it comes and goes at irregular intervals of time, is connected with the state of the constitution, is more under the influence of quina than of iron, but is difficult permanently to cure.

3. *Rheumatic* or *arthritic* neuralgia affects the branches of the fifth pair going to the teeth, long before it attacks the orbital branches of the same nerve; the teeth have decayed, and many of them have dropped out; the patients are, in general, old and feeble, and have long suffered from dyspepsia, their eyes are covered with those varicose vessels, which some of the German ophthalmologists have styled *vasa abdominalia;* their crystalline lenses have become yellow, and their retinæ are unsound. Over such cases, belladonna, taken internally, exercises a surprising control.

4. Some neuralgiæ may be temporarily allayed by opium, but are curable by no means yet discovered, neither iron, nor quina, nor belladonna. The painful paroxysms are associated with a variety of symptoms indicative of serious *organic changes within the head*, producing pressure on other nerves as well as irritation of the fifth, and sometimes attended with visible deformation of the cranium. Every disease is organic, but this depends on organic changes, which, in general, are totally beyond the reach of cure.

Symptoms. In the commencement of neuralgia, the pain occurs only momentarily, and perhaps not oftener than once or twice in the 24 hours. The upper eyelid, the middle of the eyebrow, the nasal extremity of the superciliary arch, or the temple, is its most frequent seat. The side of the nose, the lower lid, the cheek, the ball of the eye, and the parts behind the eye, are less commonly affected in incipient cases. As the disease proceeds, the pain becomes more violent, but still continues only for an instant, and is compared by some patients to an electric shock. Gradually its attacks are more frequently repeated, last longer, although rarely above half a minute, and attain a degree of overpowering severity. The pain is almost always referred to one spot. In advanced cases, we observe, that during a paroxysm, the eyebrows are knit, the lids firmly closed, the angle of the mouth drawn towards the ear, the jaws pressed together, and respiration as much as possible suppressed. The muscles in the immediate vicinity of the pain are sometimes affected with a degree of quivering, tremor, or slight convulsion; but this is not an invariable symptom, and when it does occur seems to be merely an effect of the violence of the pain. The pain is not equally violent during the whole time of an attack. In general, it increases by degrees, and is most severe a short time before it ceases. This disease may, in some cases, be said to be continued; but in general it is remittent, and, in many instances, it is completely intermittent, so that whenever the fit is over, the patient feels perfectly free from uneasiness in the part, which but an instant before was the seat of excruciating

pain. We meet with cases, however, in which a degree of uneasiness still continues, although the agonizing pain is gone. In long continued cases, the parts to which the pain is referred, become swoln from serous effusion into the cellular tissue, and so exquisitely tender that they cannot bear the slightest touch. Facial neuralgia sometimes alternates with severe nervous pain in other parts of the body; as, in the leg. In other cases, it alternates with ague.

In cases originating in wounds, a hard cord may sometimes be traced along the forehead, in the course of the supraorbitary nerve.

The symptoms occasionally attendant on neuralgia of the fifth pair, and indicative of serious organic changes within the cranium, are amaurosis, inflammation of the conjunctiva and sclerotica, inflammation of the iris, or, at least, discoloration of the iris with contracted pupil, easily distinguishable from any of the ophthalmiæ, inflammation of the cornea with onyx ending in ulceration, palsy of the muscles of the eyeball, and of the levator palpebræ superioris, and deformity of the bones forming the back and roof of the throat. The inflammation and other changes of the eye in such cases resemble very much the effects produced in Magendie's experiment of dividing the trunk of the fifth nerve. In one case of this sort which came under my care, the uvula was drawn entirely to one side, and a tumour was felt behind the veil of the palate, which I regarded as perhaps owing to a dilated state of one of the sphenoid sinuses. In such cases, the patient by and by manifests a stumbling walk, and a drawling speech, he has epileptic fits, his intellect becomes deranged, and at last a stroke of apoplexy is the immediate precursor of death.

Constitutional symptoms. It is only in confirmed cases that any symptoms of this kind are present. When the disease has continued for a length of time without amelioration, and the attacks are very frequent, the patient becomes restless and melancholy, insensible to the pleasures of society, and incapable of occupation. The appetite for food fails, digestion is impaired, the bowels are constipated, the body becomes emaciated, the sexual passion is extinguished, and the patient is almost totally deprived of sleep. In some instances, facial neuralgia is accompanied with febrile symptoms: in others, with nervous debility, great coldness of the body, and especially of the extremities, with sluggish pulse.

Subjects. No age is exempt from circumocular neuralgia. Men are more frequently affected with it than women. It is by no means the nervous or hypochondriac that are most exposed to it.

Causes. In many cases, the disease appears to arise from exciting causes similar to those which produce rheumatic ophthalmia, and especially continued exposure to draughts of cold air. While causes of this sort give origin to the first attacks, we observe a variety of occasional circumstances which operate in reproducing the paroxysms; as, the motions of the face in speaking, chewing, or swallowing, simple touching of the part, the shocks which the body is apt to undergo in walking or riding, the blowing of the wind over

the face, the sudden opening or shutting of a door, and many others. The paroxysms are much more frequent during the day, on account of the presence of many more exciting causes, than during the night. The complaint is much aggravated during the prevalence of easterly or north-easterly winds.

We are unable to say any thing certain regarding the proximate cause of simple neuralgia.

When neuralgia is the result of a wound, there is reason to think that inflammation of the nerve, with hypertrophy and induration, has been produced.

When there are paralytic symptoms along with neuralgia, it is probable that pressure on the third and fifth pairs exists within the cranium, from thickening of the dura mater or of the cranium, spiculæ of bone, or the like.[1] It is plain that neuralgia does not constitute the original disease, and that in many cases the evil does not reside in the branches of the fifth pair to which the pain is referred. By investigating the history of the patient's previous health, we shall find reason, in some cases, to suspect syphilitic nodes, or exostoses, within the skull; and in every case, we must direct our attention not merely to the particular symptoms for which the patient seeks relief, but to the state of the functions generally. If the explanation of the symptoms be obscure, we must watch, with more than ordinary attention, their progress, or their retrocession, under the influence of the remedies we prescribe.

Treatment. The means which are found most successful appear to have been discovered solely by experience. Although some of them are empirically specific also in intermittent fever, practitioners appear to have had recourse to them in neuralgia, without any reference to their power over ague.

1. It is proper to attend carefully to the state of the patient's stomach and bowels. Dr Vaidy has recorded a striking case, cured by the emetic and purgative effect of three grains of tartrate of antimony. On purging with calomel at bed-time, followed next morning by salts and senna, or compound powder of jalap, copious dark stools are generally evacuated, followed by much relief.

2. We are highly indebted to Mr Hutchinson, of Southwell, for the introduction of the precipitated carbonate of iron, as a remedy in neuralgia. I have used it in a variety of cases, both simple and complicated. In the former it has always proved successful. In painful affections of the circumorbital region, accompanying glaucoma and amaurosis, I have also found it serviceable. In cases apparently connected with serious organic changes within the cranium, it has not appeared to be productive of any effect.

As the precipitated carbonate of iron is perfectly innocuous, we may commence with a large dose. I generally order a drachm every hour, in a wine-glassful of water. Mr Hutchinson mentions a case in which half a drachm three times a-day produced little perceptible benefit; he increased the dose to a drachm twice a-day, when, after three days, a very sensible abatement of the number

and violence of the paroxysms was observed; he again increased the dose to four scruples twice a-day, in which the patient persevered regularly for ten weeks, at the expiration of which time, not the slightest vestige of the disease remained. He gives several other cases, in which little or no effect was produced by smaller doses than four scruples twice a-day. Mr Hutchinson's pamphlet is well worthy of perusal.[2]

3. When carbonate of iron fails, I am in the habit of exhibiting large doses of sulphate of quina. Five or six grains require to be given thrice a-day, or oftener. This medicine proves most efficacious in intermittent cases.[3] I have known the daily dose of 24 grains, repeated for a few days, cure the disease, where both iron and belladonna had failed.

4. Another remedy of great utility in the treatment of this disease is belladonna, the suggestion of which we owe to Mr Bailey, of Harwich. It is a medicine of so much activity, that it must be given with a cautious hand. The form which I have occasionally adopted for internal, as well as frequently for external use, is a vinous tincture, prepared by macerating, for four days, one ounce of the extract in one pint of white wine. Of this, as a dose, I begin with five drops thrice a-day, increasing gradually to 15 drops. Besides soothing, and in many cases, removing entirely the neuralgia, the use of this medicine induces a very peculiar sense of thirst and constriction in the throat; and in larger doses, brings on cramp of the stomach, dilatation of the pupils, temporary blindness, vertigo, and a highly distressing feeling of weakness and sinking.

The cases related by Mr Bailey[4] are extremely interesting. He ventures on two or even three grains of the extract at once, and appears to have been led to this mode of exhibiting the medicine from the difficulty of getting the patients to continue smaller doses for any length of time, in consequence of its unpleasant effects, while many were completely and permanently relieved by a single large dose. I have found belladonna useful in almost every variety of neuralgia; but of late I have prescribed it less frequently than I once did, in consequence of finding so much good produced by the precipitated carbonate of iron.

5. Although in many instances, any degree of affection of the mouth, from mercury, is found rather to aggravate the symptoms of neuralgia, yet calomel and opium have been recommended, and have occasionally proved useful. When the disease depends on thickening of the bones or membranes of the cranium, calomel and opium are more likely to do good than any other remedy. In a case, attended with ulceration of the cornea, which arose without any active inflammation, and apparently merely as a consequence of the diseased state of the fifth nerve, I found calomel and opium internally, and the lunar caustic solution externally, successful in procuring the cicatrization of the ulcer. I have also known the pain subdued by salivation.

6. Arsenic, combined generally with opium, has often been tried

in this disease; and numerous instances of its efficacy have been recorded.[5]

7. Narcotics of every sort have been used in neuralgia, both internally and externally.

Temporary relief is generally obtained from preparations of opium. Sir Henry Halford notices a case, however, in which opiates gave relief only at night, but failed in the largest doses in the daytime.

Mr Lawrence states,[6] that of all the narcotics, the only one on which he has any reliance is conium. Given largely, and at short intervals, so as to produce some of its peculiar effects on the nervous system, he has known it put a stop to the paroxysms, and for such a length of time that he had come to the conclusion that it had cured the disease. In some instances, he states, where persons remained well for several months, and even, in one case, for more than a year after the use of the conium, although the pains again returned, yet the agony was considerably controlled by this medicine.

An extract of the seeds of stramonium in doses of half a grain, two hours before the paroxysm, appears to have succeeded, even in cases where sulphate of quina, and other remedies had failed.[7]

Narcotic plaisters sometimes serve to moderate the pain. They are made with opium, conium, belladonna, and the like. Dr Johnson recommends[8] one composed of soap cerate, extract of belladonna, and acetate of lead.

Ansiaux relates[9] two cases, in which a cure was effected by the daily application of acetate of morphia to a small blistered surface, near the seat of the pain.

8. Leeches over or near the spot have sometimes proved useful.[10]

9. Blisters do good. They may be raised by placing over the part, the lid of a pill-box, containing a bit of lint, moistened with concentrated aqua ammoniæ. A tartar emetic plaister has been known to prove efficacious, by causing pustules and ulcers over the pained part.

10. In the incurable cases, depending on organic changes within the cranium, palliatives must be employed. A local vapour bath, external applications of conium, or belladonna, stimulating liniments combined with laudanum, blisters, and moxa, afford temporary relief. Sometimes these even remove the pain permanently, although the disease on which the pain depended is slowly advancing. Pressure in the course of the affected nerve, though it often excites, is sometimes found to relieve, attacks of neuralgia. Friction with tar on the pained part, and in the neighbourhood, has been found useful.[11]

11. The division of the affected nerves, as they make their exit from the orbit, a remedy which, until these few years, was generally had recourse to, is now laid aside, the benefit derived, in some instances, from that operation, having proved only temporary.[12]

§ 2. *Hemicrania.*

Nearly allied to neuralgia, is a painful affection which sometimes extends to the forehead and face, and especially to the orbit and eyeball, assumes more or less of an intermittent form, and receives from the circumstance of its being generally confined to one side of the head, the name of *hemicrania*. An inflammation of the eye, chiefly sclerotic, easily distinguished from any of the ordinary forms of the ophthalmiæ, sometimes attends this disease. The iris is occasionally discoloured, and the pupil irregularly expanded or contracted; but there is no effusion of lymph. Vision is somewhat dim.

The disease is often connected with a hysteric diathesis. It is frequently an attendant on pregnancy, or occurs during the debility brought on by suckling. Its intermittent character is sometimes to be traced to a connexion with causes on which ague depends.

The remedies most efficacious are such as afford relief in genuine intermittents. Frequently, when bark fails, the arsenical solution is found to act most favourably; and I have known several cases completely cured by the use of sarsaparilla.

"In the treatment of cases of this kind" observes Dr Bright,[13] "it is occasionally impossible not to feel anxious, lest some more fixed disease should be giving rise to the symptoms, more particularly if other circumstances, as sickness, giddiness, or loss of power or sensation, should casually occur. But while we carefully watch every new symptom, we must not be induced too easily to relinquish our remedy, as it frequently happens that several days elapse before any improvement is manifest."

This last remark applies, whatever be the remedy we have selected.

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[1] See Halford's Essays and Orations, p. 39; London, 1831.

[2] Cases of Neuralgia Spasmodica, commonly called Tic Douloureux, successfully treated; London, 1822.

[3] Van Swieten, Commentaria in Boerhaavii Aphorismos, Tom. ii. § 757.

[4] Observations relative to the Use of Belladonna in Painful Disorders of the Head and Face; London, 1818.

[5] Gräfe und Walther's Journal der Chirurgie und Augenheilkunde, Vol. iv. p. 676; Berlin, 1822. Collections from the unpublished Medical Writings of C. H. Parry, M.D; Vol. i. p. 560; London, 1825.

[6] Lectures on Surgery, in the London Medical Gazette, Vol. vi. p. 647; London, 1830.

[7] Journal Complémentaire du Dictionaire des Sciences Médicales, Tome viii. p. 182; Paris, 1820.

[8] Medico-chirurgical Review, January 1837, p. 235.

[9] Clinique Chirurgicale, p. 306; Liège, 1829.

[10] See Vaidy, in Journal Complémentaire du Dictionaire des Sciences Medicales, Tome viii. p. 180; Paris, 1820.

[11] See Colville, in Edinburgh Medical and Surgical Journal, Vol. x. p. 288; Edinburgh, 1814.

[12] On Neuralgia, consult Nervous System of the Human Body, by Sir Charles Bell, Appendix, p. 109; London, 1830. Anatomy, Physiology, and Diseases of

the Teeth, by Thomas Bell, p. 309; London, 1829. Essay on the Remittent and Intermittent Diseases, by John Macculloch, M.D; Vol. ii. p. 1; London, 1828.

[13] Reports of Medical Cases, Vol. ii. p. 508; London, 1831.

SECTION II.—ANÆSTHESIA OF THE PARTS SUPPLIED BY THE FIFTH NERVE.

Symptoms. When disease within the cranium affects principally the fifth nerve, a train of symptoms is produced, similar to the changes which have been observed to follow the division of its trunk in experiments on the lower animals. Besides anæsthesia of the skin of the eyelids, the conjunctiva, the Schneiderian membrane, and other parts supplied with common sensibility by the fifth pair, and loss of taste in the corresponding side of the tongue, inflammation of the eye takes place, ending in ulceration and opacity of the cornea, and the retina becomes more or less amaurotic. There is generally loss of power in the masseter and buccinator, showing that the muscular root is involved as well as the sensitive. Severe neuralgia sometimes precedes anæsthesia, alternates with it, or even accompanies it; so that though the parts affected are insensible to external impressions, such as pricking or scratching, they communicate to the sensorium acute feelings of pain, arising from internal morbid changes affecting the trunk of the nerve. From the third pair being often involved in the diseased state of the brain or its coverings, the internal, superior, and inferior recti, and the levator of the upper lid, are apt to be at the same time affected with paralysis. In a patient shown by M. Montault[1] at Magendie's lectures, the eye was turned inwards in consequence of palsy of the abductor. So complete was the loss of sensation in the conjunctiva, in this instance, that the patient could seize his eye with his fingers, and turn it outwards, without winking, without suffering any pain, and even without feeling that the eye was touched.

The various symptoms, now mentioned, follow each other, sometimes in one order, sometimes in another. In some cases the amaurosis, in others the neuralgia, and in others the anæsthesia, is the complaint which attracts most attention; sometimes the disease is looked upon as merely an obstinate ophthalmia, and in other instances it is considered as a paralysis.

Pathological Anatomy. Scrofulous and other tumours pressing on the root of the fifth nerve, ramollissement of part of the brain, induration, ramollissement, and atrophy of the nerve, are the changes which have been detected on dissection, in cases of anæsthesia.

Cases. Numerous cases of anæsthesia of the parts supplied by the fifth nerve are recorded.[2]

[1] *Case* 281.—L. A. a healthy girl about 20, came under the care of Sir Charles Bell, in October 1822. Seven years before that period, she had received a blow

with a stick on the right eye, after which she thought that the sight was never so good. The dimness had increased, but she could still distinguish small objects till June 1822. At that time, she became affected with pain in the right ear, deafness, and a discharge from the ear; she also suffered from severe headachs, affecting only the right side of the head, and soon after, lost the sight of the right eye altogether. She felt a dull pain at the internal canthus, which seldom abated, and at times there was a copious flow of tears. The motion of the iris remained perfect. Things continued in this state for about two months, when the pain and discharge from the ear ceased, and in a few days more the surface of the eye became perfectly insensible to the touch. This loss of feeling extended to the lining of the eyelids, to the skin covering them, and to the skin of the cheek and forehead for about an inch round the eye; it did not go beyond the middle line of the face. When she told Sir Charles that her eye was dead, as she expressed it, he drew his finger over its surface, and so far was this from giving her pain, that she assured him she could not feel that he was touching it at all. The eyelids made no effort to close while he was doing this, but the conjunctiva appeared sensible to the stimulus, as a number of vessels on the surface of the eye became immediately injected with blood.

At this time, a perpetual blister was applied behind the ear, and two grains of calomel given night and morning, with a view of affecting her mouth. After a few days, however, the pain in the ear and deafness increased, but with scarcely any discharge; and, at the same time, the sensibility of the eye and surrounding skin returned. The sight appeared totally gone. Partial headachs continued, and at times the patient felt pain at the inner corner of the eye. She had always a perfect command over the muscles of the face and eyelids, and there was no affection whatever of the muscles of the face.

On the 25th October, she had a violent hysteric fit, followed by general headach. The latter subsided after venesection, a cold embrocation to the vertex, a blister to the nape of the neck, and free purging. Apprehensive lest organic disease might be extending itself in the head, Sir Charles kept her confined to bed and on the lowest regimen, and purged her daily.

On the 2d November, she said she had felt all night as if there was sand in the blind eye, and that sometimes sparks of fire seemed to pass through it. There was no change in the appearance of the eye. On the 3d, when she awoke, these sensations were gone, but she was agreeably surprised to find that her sight was restored. When the left eye was closed, she could see large objects very distinctly with the right, but could not read or discern any thing very small.

On the 4th, she could read small print, and the sight, although not quite so good as in the left eye, soon became pretty much as it had been immediately after the injury.

The blow on the eye had probably produced only a predisposition to disease. The gradual manner in which the sight was lost, and its sudden recovery when her system was reduced by severe evacuation, point out the connexion of her complaint with an increasing fulness of habit. The only nerves affected appeared to have been the optic, and at one time the first division of the fifth nerve.[3]

Case 282.—A patient, under the care of Dr Alison, was affected with loss of common sensation in the left side of the face, the left nostril, and left side of the tongue, with insensibility of the ball of the eye, and occasional bloody discharge from the left nostril; and was liable to attacks of pain, occasionally accompanied with fever, during which the pain was chiefly referred to the insensible parts. There were frequent attacks of inflammation of the left eye, with dimness of the cornea, which were relieved from time to time by the usual antiphlogistic means; but at the end of two months, a line formed round the base of the cornea, which at length sloughed out, and the contents of the eye were entirely discharged. The muscles of the left side of the jaw were paralytic, and felt quite flaccid when the patient chewed or clenched the jaws, but the motion of the muscles of the cheek was unimpaired. After the destruction of the eye, the paralytic symptoms remained stationary for a year or more, there was then a violent return of headach, with fever, and death in a state of coma, after an illness of a fortnight.

On inspection, there was found considerable ramollissement of some of the central part of the brain. The fifth nerve of the left side, on being traced back-

wards from the ganglion, was found close to the ganglion to be of a very dense texture, but beyond this it was much wasted, and at its junction with the tuber annulare, nothing but the membranes seemed to remain.[4]

Case 283.—A young man, an epileptic in the hospital *La Pitié*, died on the 12th of August 1824, after having been under the care of M. Serres, for ten or eleven months.

When he was admitted into the hospital, he complained, in addition to his epileptic seizures, of slight inflammation of the right eye. The inflammation increased, the cornea became opaque, and sight, at first disordered, was ultimately lost by this cause. The organs of sense, on the right side, became successively deprived of their natural powers. This took place in June 1824. The right eye, eyelids, nostril, and half of the tongue, were deprived of sensation, while the same parts on the left side possessed it perfectly. Shortly after, the disease was aggravated by a scorbutic affection, which first manifested itself on the right side of both maxillæ, on this side laying the teeth bare by an affection of the gums. In the advanced stage of this disease, complete deafness took place on the right side.

On dissection, the ganglion of the fifth nerve on the right side was found to be swoln, of a yellow colour, and less vascular than usual; and the nerve, where it seems inserted into the pons Varolii, was changed into a yellow gelatinous substance, like the ganglion, which substance transmitted small processes into the pons, in the direction of the fasciculi of the insertion of the nerve. The muscular branches of the affected nerve were unaltered, and the action of mastication had never been disturbed.[5]

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[1] Journal Hebdomadaire des progrès des Sciences Médicales, Tome i. p. 368; Paris, 1836.

[2] Bell's Nervous System of the Human Body, Appendix, pp. xxiii. lxxvii, lxxx, xcii, cv; London, 1830. Stanley, in London Medical Gazette, Vol. i. p. 531; London, 1828. Montault, in Journal Générale de Médecine, Avril, 1829. Carron du Villards, in Journal Complémentaire des Sciences Médicales, Vol. xliv. p. 13. Burton, in London Medical Gazette, Vol. xvi. p. 366; London, 1835.

[3] Op. Cit. Appendix, p. c; London, 1830.

[4] Abercrombie's Pathological and Practical Researches on Diseases of the Brain, p. 447; Edinburgh, 1829.

[5] Serres, Anatomie Comparée du Cerveau, Tome ii. p. 67; Paris, 1827.

CHAPTER XXIV.

AMAUROSIS.

SECTION I.—GENERAL ACCOUNT OF AMAUROSIS; ITS DEFINITION, SEATS, CAUSES, SYMPTOMS, STAGES AND DEGREES, DIAGNOSIS, PROGNOSIS, AND TREATMENT.

I. *Definition.* By *amaurosis*[1] is meant obscurity of vision, depending on a morbid condition of one or several of the nervous parts, which assist in forming the optic apparatus. It is a disease, there-

fore, arising from causes entirely different from those which prevent the rays of light from entering or passing through the eye.

If the retina be incapable of receiving with correctness impressions of external objects through the medium of light, if the optic nerve be unable to convey to the sensorium the impressions made upon the retina, or if the brain be incapable of receiving the impressions conveyed by the optic nerve, the individual must be affected with an obscurity in vision, or suffer a total deprivation of sight, according to the degree of inability in these several parts to execute their functions. Even when he goes no farther than this, the pathologist must see the necessity of distinguishing different cases of amaurosis, according as the retina, the optic nerve, or the brain, is the part first and principally affected.

There is a previous question, however, which ought to be settled in all cases of impaired or destroyed vision, but which is too often overlooked; *viz.* Is there sufficient cause for the symptoms in those parts of the eye which lie in juxtaposition with the retina, namely the vitreous humour and the choroid, independently of any primary affection of the retina, optic nerve, or brain? Let the oculist attend to this, and not wander into a field of uncertainty, such as encephalic diseases but too often prove, when, perhaps, a sufficient explanation of the symptoms lies open to him in the state of the eyeball itself. It will be evident, on the slightest consideration, how necessary it is to distinguish glaucoma from amaurosis, were it for no other reason than that the patient may be saved from the pain and other bad effects of remedies which can be of no service, but on the contrary may injure his constitution, and must at all events disappoint his hopes.

II. *Seats.* In order to prevent, if possible, our falling into false notions regarding the seats of amaurosis, it may be proper to recall to mind the following anatomical and physiological facts.

1. The optic nerves originate, a little behind the middle of the cerebral mass, from the corpora quadrigemina; and are, therefore, in communication with the posterior part of the medulla oblongata. The broad slip of medullary substance by which the nerve on each side seems to commence, turns round upon the outer edge of the mass commonly called the thalamus and adheres to it, crosses and adheres to the crus cerebri, attaches itself to the middle lobe of the cerebrum, becomes intimately connected with the floor of the third ventricle formed by the tuber cinereum, and unites with its fellow-nerve of the opposite side.

2. Numerous cases on record, in which atrophy of one of the optic nerves has been traced from a diseased eye to the opposite side of the brain, fully establish the fact of at least a partial decussation of the optic nerves.[2] The outermost fibres of each nerve appear to continue their course toward the orbits without crossing; probably the innermost fibres pass from the one side to the other.

3. There is no proportion, and but slight connexion, between the optic thalami and the nerves of vision. In the horse, ox, sheep,

&c. the optic nerves are as large as in man, but the thalami in man are much larger than in those animals. On examining the structure of the thalamus, a merely superficial layer of it is found to be attached to the optic nerve, while the whole of its interior fibres diverge backwards into the cerebral convolutions. When the optic nerve is affected with atrophy, the corresponding thalamus is diminished only in so far as the nerve itself has shrunk; the interior of the thalamus suffers no change, but the atrophic state of the nerve may be traced back to the corpora quadrigemina. In the brain of a woman who had died insane, Dr Spurzheim[3] found the thalamus of the left side half converted into pus, the corpus striatum of the same side much shrunk, but the optic nerve healthy, and resembling in all respects its fellow of the opposite side, in the vicinity of which no organic change could be detected. The anterior pair of quadrigeminal bodies were also in their natural state. Dr Parry[4] found the thalami nearly obliterated, with the nerves healthy. Numerous cases might be quoted of disease in the thalami, without any affection of vision.[5]

4. Each retina is probably a plexus, derived nearly equally from the two optic nerves. But besides these, there is reason to believe that the retina is in communication with other nerves; that it influences them, and, on the other hand, is under their influence. If we trace the great sympathetic nerve upwards from the first cervical ganglion, we find that the branches of the nerve surround the internal carotid artery, and pass with it into the carotid canal of the temporal bone. Within the cavernous sinus, the great sympathetic forms a ganglion, whence are derived branches which communicate with the nerves of the sixth pair, third pair, and first division of the fifth pair. One or more branches of the cavernous ganglion communicate directly with the lenticular ganglion. Tiedemann[6] thought he traced branches from the lenticular ganglion to the retina. The internal carotid artery, as it mounts within the cranium, is still surrounded by branches of the great sympathetic nerve, which cling to it, and may be traced along its ramifications. The ophthalmic artery, with the rest, is invested with a plexus from this nerve, and in this way the arteries of the choroid, iris, and retina, are supplied with its influence. From the lenticular ganglion arise the nerves of the iris, and Ribes[7] supposes that he has traced branches from the ciliary or iridal nerves, where they lie between the sclerotica and choroid, penetrating the latter membrane, and running backwards into the retina.

5. When, in birds, we wound one of the optic lobes, which are analogous to the anterior corpora quadrigemina of mammiferous animals, the vision of the opposite eye becomes weak or extinct. If, after a time, the same experiment is performed on the other side of the brain, the eye which formerly continued sound, becomes blind.[8]

6. If the optic nerve be divided in any animal, anteriorly to the decussation of the two nerves, the pupil of the eye on the same side becomes very large and motionless, and the power of vision of that

eye is immediately abolished. Every trace of sensibility to light is lost, so that even on concentrating the light of the sun by means of a lens, and directing it into the pupil, not the least symptom of sensation is produced.

7. If the chiasma of the optic nerves is divided longitudinally, blindness, with dilated pupils, is the result.

8. It is generally acknowledged that the fifth pair of nerves communicate common sensibility to the parts to which they are distributed; but over the eye, they certainly exercise a very remarkable influence. If the trunk of the fifth nerve is divided in rabbits, guinea pigs, dogs, or cats, there is immediately produced fixed contracted pupil in the two rodentia, fixed expanded pupil in the two carnivora, and in all blindness, almost as complete as when the optic nerve is divided. In the rabbit, it is believed, that the ciliary or iridal nerves are derived solely from the third pair, and that they do not form any lenticular ganglion; in the cat, there is a lenticular ganglion, as in man, formed partly by the third, and partly by the fifth pair. It scarcely admits of a doubt, that the integrity of the fifth pair, is a necessary condition, not only for the action of the parts which nourish the eye, but even for the action of the retina as a sentient organ.[9]

9. If the trunk of the third nerve be divided within the cranium of a pigeon, the pupil dilates, and cannot be made to contract by exposure to intense light. The section of the fifth nerve in the same animal produces no change in the motions of the iris. In birds, the third pair supplies the whole of the nerves of the iris. When the optic nerves are pinched within the cranium of a pigeon, the pupils contract. The same result follows a similar irritation of the third pair, but not that of the fifth. When the optic nerves have been divided within the cranium of a pigeon, if the portion of the nerves attached to the eyes be pinched, no contraction of the pupil ensues; but if the portion adhering to the brain be pinched, a like contraction of the pupil ensues as if the optic nerves had not been divided. If the third pair has been divided, no change in the pupil ensues on irritating the entire or divided optic nerves. From these facts, it may fairly be concluded, that in the habitual variations of the pupil, an impression is conveyed along the optic nerve to the brain, which is followed by an affection of the third nerve, causing the pupil to contract or dilate.[10]

10. If the great sympathetic be divided on one side of the neck of a dog, the pupil becomes fixed and contracted, and the nutrition of the eye is interrupted. If the experiment be performed on both sides, the pupils become fixed and dilated. Petit considers these different effects as analogous to what takes place in amaurosis; for if one eye only be amaurotic, the pupil of that eye does not, in general, become dilated; but if both eyes be blind, both pupils dilate.[11]

From these anatomical and physiological facts, I do not draw any farther conclusions than these, that a strict inquiry into the

seats of the different varieties of amaurosis, will necessarily embrace a field of considerable extent, and that we need not be surprised to meet, in the course of such inquiry, with many facts, which may appear not only inexplicable, but even contradictory.

III. *Causes. Efficient causes.* Amaurosis may depend simply on *pressure* affecting the retina, optic nerve, or brain, or on some *structural change* in one or other of these parts. It is on this two-fold principle, that I shall afterwards classify the efficient causes of the disease.

Inflammation primarily affecting any portion of the nervous optic apparatus, or the secondary effects of inflammation, or its tertiary effects, (see page 353) on the brain, its membranes, the optic nerve, or the retina, may cause amaurosis. It is possible that amaurosis may sometimes be the product of disorders originating in the nervous substance of the optic apparatus; but much more frequently disorders of the sanguiferous system, affecting the nervous substance, cause the disease. It is plain that no sensorial function can be carried on in a perfect state, without the due co-operation of the sanguiferous and nervous systems. Of diseases essentially nervous, we know very little; the greater part of the morbid affections of the nervous system with which we are acquainted, originate in vascular derangements.

The structural changes which produce amaurosis are, in general, inflammation, in its primary stage, or some of the secondary, or tertiary effects of inflammation, such as suppuration, ulceration, induration, ramollissement, hypertrophy, atrophy, &c. The structural change may be either removable or permanent.

The cause of amaurosis is evidently, in many cases, pressure, impeding the communication of nervous influence. Pressure may produce amaurosis immediately or mediately. An enlarged pituitary gland will press directly on the optic nerves; a tumour attached to the tentorium will press indirectly on the optic apparatus. Pressure by an exostosis, or other tumour, or by gorged blood-vessels, is a thing with which we are familiar; but even when amaurosis is the result of inflammation, it can scarcely be doubted, that the optic apparatus suffers a pressure, which renders it incapable of fulfilling its proper functions. Sir Charles Bell has promulgated a somewhat different view of the proximate cause of those diseases, which are generally attributed to compression of the brain, maintaining that what is called compression in this instance, operates not on the substance of the brain itself, but simply by preventing that due supply of arterial blood, which is necessary for the performance of the cerebral functions.[12] There can be no doubt, however, that where the bulk of any part of the body is diminished by compression, the mechanical effect is an increased activity of the absorbents, as well as a diminished supply of blood.

I need scarcely mention, that amaurosis always results from an *organic cause*, a *structural change* in the optic apparatus or in the surrounding parts. The notion of such a thing as a *func-*

tional amaurosis appears to have originated in the hypothesis, entertained by many, that mental disorders are often functional merely, and not dependent on any structural derangement of the brain. This hypothesis, which even in respect to mental affections is probably unfounded,[13] has been unwarrantably extended to sensorial disorders. While we acknowledge the facts, that amaurosis is sometimes sympathetic, or arises in consequence of derangement of some remote organ, and that it is occasionally sudden in its attack, or, on the other hand, instantaneous in its departure, yet it cannot admit of doubt, that, in all cases, and even in cases of sympathetic amaurosis, the loss of sight must depend on some organic change affecting the optic apparatus. Take, for example, the amaurosis which arises from the presence of worms in the bowels. This result is only occasional; the brain, of perhaps not more than one out of a thousand affected with worms, is so susceptible of disease, that the irritation communicated to it from the bowels, is sufficient to excite it to that morbid condition, which causes dilatation of the pupils and loss of vision; but that the amaurosis, in these cases, is the consequence of any thing else than a certain morbid condition of the optic apparatus, is a proposition which scarcely deserves a serious refutation. Neither can it be admitted, when amaurosis occurs suddenly, as a disease of relation, that it is independent of organic derangement in the optic apparatus, however indubitable it may be that the first link in the chain of causes has existed in some remote part of the body.

Remote causes. Amaurosis springs from many and various predisposing and exciting causes.

1. We meet with instances of a hereditary predisposition to the disease; so that several members of the same family, or of successive families, lose their sight, about the same period of life. Beer knew several families who had a hereditary tendency to amaurosis. In one of them, even through three successive generations, all the females who had not borne children, became blind when they ceased to menstruate. The males of this family, who as well as the females, had dark-brown eyes, also showed a decided tendency to the disease, although none of them lost their sight.[14]

2. Over-exertion of the sight, exposure of it to bright light, or great heat, occupation of it upon minute objects, and employment of the eyes during the hours which ought to be devoted to sleep, form a set of causes which are extremely productive of amaurosis. In many instances, a single imprudent exposure of the eyes to the operation of some such cause as those now mentioned, has been sufficient to extinguish the sensibility of the retina; but, in general, it is from long-continued over-excitement of the organs of vision, that they begin to fail, and at last become totally unable to continue their office.

3. A third set of predisposing and exciting causes are such as directly or indirectly promote determination of blood to the eyes, or sanguineous congestion, inflammation, or serous effusion, in the

head; such as insolation, rage, forced exertions of the body, occupations which require continued stooping, errors in diet, and especially the abuse of wine and spirits, retrocession of eruptive diseases, suppressed discharges of blood, perspiration, pus, &c. interruption or entire cessation of the menses, and slowness of the bowels. Typhus fever, from its congestive effects on the brain, often produces amblyopia and amaurosis.

4. The operation of poisonous substances sometimes produces a sudden attack of amaurosis. Belladonna, stramonium, and some other narcotics, in large doses, are almost immediately followed by this effect. Other poisonous substances, applied to the body, in small quantities every day, or several times every day, are probably productive of a similar effect, only that they operate more slowly. I am inclined particularly to signalize tobacco as a poison of this sort; but many others have been accused of an insidious operation on the nervous system, terminating in blindness.

5. Gastric and intestinal irritation, acute or chronic, is in many instances the forerunner of amaurosis, and evidently operates as its exciting cause, probably through the medium of the great sympathetic nerve.

6. Exhaustion of the body, such as that which arises from chronic diarrhœa, manustupration, excessive venery, neglected leucorrhœa, prolonged suckling, typhus fever, and the like, is a frequent cause of amaurosis. There is reason to believe that local congestions and inflammations may accompany the state of general weakness, produced by the causes here enumerated; and from such local affections, ending in atrophy of the optic apparatus, the amaurosis which occurs under such circumstances, probably takes its origin. Depressing mental affections, grief, care and melancholy, operate in the same way in producing the disease.

7. Blows on the head, injuries of the branches of the fifth nerve, and even mere irritation of this nerve, have sometimes proved the remote causes of amaurosis.

8. Those who have suffered from scrofulous or other chronic ophthalmiæ in childhood, are very liable to become amaurotic, after they begin to use their eyes in earnest, or later in life, and especially if exposed to one or more of the unfavourable influences just now enumerated.

Complication of causes. If we investigate with care the history of the cases of amaurosis which come before us, we shall find that the disease can seldom be attributed to the influence of any single remote cause; but that most frequently a number of circumstances favourable to the rise and progress of an amaurotic affection, have for a length of time been acting on the individual, either consecutively, or together. It is chiefly the combination of causes, which at once renders it so difficult to discriminate with correctness between the different species of amaurosis, to classify them, and in many cases, to decide on a proper line of treatment, and which but

too often serves also to frustrate the cure, even when the remedies are judiciously selected, and carefully applied.

IV. *Symptoms.* The symptoms of amaurosis naturally arrange themselves into two classes; the *objective* and the *subjective*. The former class includes those which the *observer* discovers in the form, colour, texture, consistency, vascularity, and mobility of the different parts of the organ of vision, or in the general health of the patient; the latter, those which the *patient* himself experiences, and which must be admitted very much upon his own testimony, as impaired and deranged vision, headach, giddiness, &c. In general, it is advisable in examining any case of amaurosis, first to attend to the objective, and then to the subjective symptoms. Each eye ought also to be inspected separately, while the other is excluded from the light. Even in the history of his loss of vision, we ought to confine the patient to one eye at a time, unless both appear to have become affected at the same period, and from the same cause.

I. Objective symptoms. 1. The first symptom, which, in general, attracts the attention of an experienced observer, is the gait, and cast of eye, of the amaurotic patient. He advances towards us with an air of uncertainty in his movements, from which the cataractous patient is generally exempt, and instead of converging his eyes in the natural way towards an object, it is evident that there is something vacant and unmeaning in his look. The latter symptom, which Richter[15] appears to confound with squinting, may exist, indeed, only in a very slight degree. It is, however, as that author well observes, the only objective sign of amaurosis, which never fails to be present, a fact peculiarly valuable, in cases where we have reason to suspect simulation on the part of the patient. In some cases of amaurosis, there is not merely the want of direction and control of the eyes, of which we are now speaking, and which is the consequence of deficient sensation, but there is actual strabismus. In many there is oscillation, and in some the eyes stand completely fixed in the head.

The motions of the lids also, as well as those of the eyes, are not unfrequently impeded; in some, the levator of the upper lid, and in others, the orbicularis palpebrarum, being partially or completely palsied, according as the motor oculi, or the facial nerve is prevented from communicating its natural degree of influence to the muscles which it supplies.

2. Besides the movements of the eyes, their prominence, size, colour, consistence, and form, deserve attention. We often observe them unnaturally prominent, or the one more prominent than the other; they are not unfrequently small, an effect of scrofulous ophthalmia in childhood; their colour is seldom that of the healthy eye, the sclerotica being frequently of a yellowish hue, sometimes bluish or ash-coloured, and often covered with varicose vessels; while there are few symptoms of amaurosis so certain as a change in the consistence of the eyeball, it being either considerably firmer

to the touch, or greatly softer than natural. In some instances, we find the eye flattened on one or several of its sides.

Some of these changes may be considered as causes and others as effects of amaurosis. The loss of the special function of an organ of sense often leads to an enfeebled state of its organic functions. The consequences are a set of *secondary* changes, which must not be confounded with those, which, being the cause of the loss of sensibility, may be called *primary*.

3. Sluggish and limited motion of the pupil, or entire loss of motion, often attended with dilatation, forms one of the most remarkable symptoms of amaurosis. If the pupil is widely dilated and fixed, pressure on the brain is the probable cause of the amaurosis; as, in hydrocephalus. If the pupils are small and sluggish in their motions, atrophy of the optic nerves is the probable cause. In this case, belladonna has little effect in dilating the pupils. That a dilated state of one pupil is not always connected with pressure on the brain, nor even with any cerebral disease, is evident from the fact, that it is sometimes induced simply by a blow on the eye. The early and incomplete stages of amaurosis are rarely accompanied by widely dilated pupil, but only by sluggishness and a limited degree of motion. After the perception of light is altogether extinct, the opening is generally found expanded and quite motionless.

There are two facts regarding the motions of the pupil in certain amaurotic cases, which have attracted much attention. The first is, that the pupil of a completely amaurotic eye will often move briskly, according to the degree of light acting on the opposite or sound eye, while, if we expose the amaurotic eye by itself, its pupil remains perfectly motionless, and much dilated. The second fact, and one accounted still more extraordinary, is that in some cases, where the patient is totally blind, both pupils, according to the intensity of light to which the eyes are exposed, vary in diameter exactly as in health.[16]

The latter of these facts has hitherto received no probable explanation; for the idea[17] of the iris acting in such cases, by a sympathy with the retina, independent of the brain, is altogether contrary to the physiology of the iris, as founded on experiment. It appears to be absolutely necessary for the motions of that membrane, not only that the iridal or ciliary nerves, and one or other or both retinæ be sound, but that a certain degree of communication shall be kept up between one or other or both retinæ on the one hand, and the brain and iridal nerves on the other. It becomes, then, a question, whether the brain may not be so affected with disease, as to be incapable of acting as the organ of visual perception, and yet retain the power of communicating to the third nerve the impulse necessary for the usual motions of the pupil. If we suppose that the function of vision is accomplished only where the optic nerves reach the corpora quadrigemina, and thus communicate with the posterior part of the medulla oblongata, but that the association which undoubtedly exists between the optic nerves and the third pair, is accomplished farther forward

on the basis of the brain, we shall be able to afford a plausible explanation, at least, of the fact of the lively mobility of the pupils in certain cases of complete amaurosis. The third pair makes its appearance immediately behind the tuber cinereum, a part of the brain with which the optic nerves have a manifest connexion. The third pair does not, indeed, appear to take its origin from the tuber cinereum, but from the central cineritious substance of the crura cerebri, bearing an analogy, along with the sixth and ninth pairs, the portio dura of the seventh, and the portion of the fifth pair which escapes the Gasserian ganglion, to the anterior roots of the spinal nerves; but it is surely not an improbable supposition, that the optic nerves, either where they cross the crura cerebri, or, more probably, where they communicate with the tuber cinereum, form that link of connexion with the third pair, which they are universally acknowledged to do in some part or other of their course. A disease, then, affecting the corpora quadrigemina, or, in other words, the origin of the optic nerves, or affecting any part between the corpora quadrigemina, and the communication between the optic nerves and the third pair, wherever that communication is effected, will, according to this view of the subject, produce blindness, but may leave unimpaired the influence of the optic nerves upon the third pair; while the cases of amaurosis, in which the pupils are fixed and dilated, are probably owing, either to more extensive disease, or to disease so situated as to affect that part of the brain where the optic nerves communicate their influence to the third pair. This conjecture receives no inconsiderable support from a case, shortly recorded by Mr Travers, of circumscribed tumour compressing the left optic nerve, immediately behind the ganglion opticum, by which I suppose he means the thalamus. In that case the blindness was complete, but the iris was active.[18] Amaurosis, with lively pupils, has not unfrequently been found to depend on disease of the cerebellum.[19]

If the above be the true explanation of the activity of the pupils, which sometimes exists in cases of total blindness, it will also serve to account for the motions of the iris of an amaurotic eye, when the opposite sound eye is exposed to various gradations of light. The right eye, we shall say, is healthy, but the left, on account of some morbid change in the retina, or in that portion of its nerve which extends from the retina to the point of union of the optic nerves, is blind. Still the right optic nerve, dividing at the point of decussation into two portions, one to the right and the other to the left side of the brain, is in communication with both nerves of the third pair, so that although the pupil of the diseased eye becomes expanded and fixed when the sound eye is kept shut, it instantly contracts when this eye is exposed to light, and so long as this is the case, performs exactly the same motions. This view of the matter appears to be confirmed by the case of a patient at the Glasgow Eye Infirmary, in whom the retina, in consequence of an injury of the eye received some years before, was thickened, opaque,

and separated from its natural adhesion to the choroid. The lens lay in the anterior chamber, and was removed by extraction, but the eye remained perfectly insensible to light. When the diseased eye was separately exposed to light, its pupil stood fixed and dilated; but when both were exposed, the pupil of the amaurotic eye moved briskly. We had no reason to believe that, in this case, there was any other part diseased but the retina.

Besides the motions of the iris, which of course must be examined, as has been already mentioned, in each eye separately, and with the opposite eye excluded from light, there are various other particulars respecting the iris, which deserve attention; especially, the form and situation of the pupil, and the inclination of the iris, for sometimes the pupil is very irregularly dilated, at other times it has evidently shifted from its natural place towards one or other part of the circumference of the iris, while this membrane itself is in some cases observed to be bulging towards the cornea, and in others to have sunk back, so as to present anteriorly a concave or funnel-like form.

4. A point of great importance in every case of amaurosis is the appearance and consistence of the humours. In some instances, when, for example, the disease is hydrocephalic, and occurs in a young subject, the pupil presents its natural black hue, but in elderly subjects, it is rarely the case that some degree of glaucoma does not accompany amaurosis. Such a complication must, of course, render the prognosis much more or altogether unfavourable; although, at the same time, it must be confessed, that some of the most hopeless cases of amaurosis are attended with a perfectly healthy state of the humours, the cause residing, not in the eye, but in the cavity of the orbit or within the cranium.

5. It is proper to observe, whether there be any cicatrices about the face or head of amaurotic patients, marking the previous occurrence of such injuries as may either have affected the branches of the fifth pair distributed externally, and through them the optic apparatus within the cranium, or more directly have induced pressure on the brain, inflammation of its membranes, cerebral effusions, or morbid formations within the head. (See page 116.)

6. The age, general aspect, and physical and moral constitution of the patient, must be regarded with attention. We find all sorts of persons amongst the amaurotic; from him whose vessels seem on the point of bursting with plethora, and who has long revelled in the solid luxuries of the table, down to the emaciated victim of famine and habitual intoxication; all ages, all ranks, and professions; and not unfrequently it happens, that by directing our attention to the history of the individual's previous mode of life, his pursuits, and his habits, we are enabled to detect the circumstances which have been the predisposing or exciting causes of his complaint, and by the careful avoidance of which, for the future, the cure may be greatly promoted.

II. Subjective symptoms. 1. The most important of the subjective

symptoms is impaired vision. The progress of this symptom, and the degree it attains, vary in different cases; for in some instances the patient becomes suddenly and permanently blind, while, in others, the sight fails gradually during months or years, without ever terminating in total loss of sight. Hence the distinctions of *sudden* and *slow*, *complete* and *incomplete* amaurosis.

In the commencement of the disease, it often happens that the failure of sight is observed only occasionally, occurring, perhaps, but seldom, and only for a short time, (*amaurosis vaga*,) assuming the form of *night-blindness* or of *day-blindness*, or coming on regularly after any continued exertion of the eyes in the perception of minute or luminous objects. Sometimes the patient begins by finding that with both eyes he sees confusedly, and better with one open and the other closed, (*monoblepsis.*) *Diplopia* is often the first symptom. Many an amaurotic patient can read with ease a few lines of a printed book, after which the letters appear so confused, and the effort to see them is so painful, that he is obliged to desist. Sudden and temporary attacks of blindness are often connected with gastric derangement, and are entirely removed by correcting the state of the digestive organs; but it must also be confessed that such transient attacks are sometimes the effect of incipient diseases in the brain, of the most formidable kind.

The failure of sight in some cases extends to the whole field of view, and in others is only partial. On attempting to read, for example, more or less of the page appears indistinct. Perhaps the patient loses sight of a word only here and there, (*visus interruptus*,) or he sees only one-half of the page, while the other half is as if hid from his view, (*hemiopia.*) It not unfrequently happens that an amaurotic eye will still discern certain objects, if they are placed in one particular direction, (*visus obliquus ;*) but if by the slightest movement of the eye or head, the person once loses sight of the object, he finds that he cannot easily recover the same point of vision. Others catch sight of an object while it is in motion, but see almost nothing that is at rest. Some amaurotic patients see all objects disfigured, bent, mutilated, lengthened or shortened, (*visus defiguratus.*) The flame of a candle sometimes appears very long to such patients, and as if separated into several portions; a symptom which Beer considered indicative of disease within the cranium.

The failure of sight in amaurosis occasionally assumes somewhat of a *myopic* or a *presbyopic* form. I have known a confirmed amaurotic patient see large objects with considerable distinctness, through a double-concave glass of 12 inches' focus; and another patient who, totally blind in the right eye, and with the left fast hastening to the same state, could still with the latter read an ordinary type, by the aid of a double-convex glass of seven inches' focus.

2. Intimately connected with the failure of sight in amaurosis, are the various false impressions of which the patients complain; for although some maintain, that they have no sensation of any thing intervening between them and objects, and are not distressed by any

sort of spectra, yet, in general, amaurosis is more or less attended by the disorders described in a preceding chapter under the heads of *photopsia*, *muscæ volitantes*, *chrupsia*, and *accidental colours*. Photopsia, in particular, is apt to occur at the commencement of the disease in plethoric individuals, and muscæ volitantes in dyspeptic subjects. As the disease advances, the field of vision seems to become obscured by a cloud, (*visus nebulosus*,) or network, (*visus reticulatus*,) the latter generally appearing grey or black, especially in a good light, or over any white substance, but sometimes becoming luminous in the dark, and assuming a bluish-white colour, like silver, or reddish-yellow, like gold.

3. If only one eye is affected, by ascertaining at what time the patient first became liable to mistakes in those actions which require distances to be exactly distinguished, as in pouring liquor into a glass, snuffing a candle, threading a needle, &c. we may discover the duration of the disease, and thence may be assisted in forming a more just prognosis.

4. The feelings of the patient with regard to light deserve attention; for sometimes the early stages of amaurosis are accompanied by unnatural sensibility to light, and even pain on exposure to its influence, while, in other cases, there are from the very beginning, a diminished sensibility of the retina, and a constant desire on the part of the patient for a more copious illumination of all objects, or a *thirst for light*, as it has been called.

5. An unwonted dryness of the eyes and nostrils is by no means an uncommon symptom in chronic retinitis and amaurosis; and it is observed, that, in general, great benefit is obtained, in such cases, if once the secretions of the lacrymal gland, conjunctiva, and Schneiderian membrane, are restored.

6. Pain in the eyes, and still more frequently in the head and face, forms one of the most important symptoms in cases of amaurosis. Amaurosis, without pain, generally depends on atrophy of the optic nerves. If it be attended with headach, either constant or intermittent, there is probably some organic affection of the brain, or cause of pressure within the cranium. The seat, extent, and nature of the pain are to be carefully investigated. It is necessary to inquire, whether it is general over the head, hemicranial, or confined to one particular spot; whether it is dull or acute; whether it is attended by throbbing, relieved or aggravated by the horizontal position, increased during the night, affected much by temperature, exercise, or diet; and whether it is constant, intermittent, or periodic. It is also important to ascertain whether the pain is accompanied by vertigo, tinnitus aurium, nausea, a tendency to coma, sleeplessness, and the like.

7. The state of the other senses, as well as that of sight, and the state of the mental faculties, ought to be ascertained.

If amaurosis be attended with headach and loss of smell, the cause is probably a tumour in the fossa pituitaria, or over the cribriform plate of the ethmoid bone. If amaurosis of one eye be attended

with loss of hearing on the same side, and stiffness of the muscles of the face, the cause is probably a tumour attached to the posterior surface of the petrous portion of the temporal bone, or arising from the meatus auditorius internus.

If amaurosis has been followed by an affection of the mind, these diseases have probably arisen from some cause within the substance of the brain, such as, an abscess or a tumour; if the affection of the mind existed first, and has been followed by amaurosis, the morbid cause has probably commenced in the membranes or on the surface of the brain, and proceeded inwards.[20]

8. The general health, and the previous diseases of the individual, are worthy of serious consideration. Is the constitution scrofulous? Has the person suffered from venereal complaints, or long-continued courses of medicine for the cure of syphilis? Had he ever typhus fever? and if he had, how was it treated? Has he had any serious disease of the head, as phrenitis; any apoplectic, epileptic, or paralytic affection? Has he been subject to hypochondriasis, or if the patient be a female, to hysteria? Has the patient been gouty or rheumatic? What has been the condition of the digestive organs? If the patient be a female, what has been the state of the uterine system? These, and many other points, which will naturally suggest themselves to the mind of the attentive observer, ought to be made the subjects of deliberate inquiry.

V. *Forms, stages, and degrees.* It is proper to distinguish *acute* from *chronic* amaurosis; *incipient* from *confirmed;* and *incomplete* from *complete.*

Almost every species of amaurosis presents in some cases the *acute,* and in others the *chronic,* form.

In the *incipient* stage, the disease is only developing itself, the patient, in general, is not completely deprived of sight, remedies will almost always be useful in checking the progress of the complaint, and in many cases a perfect cure will be accomplished. It sometimes happens, however, that even from the very first, the blindness is complete, and the case incurable. In the *confirmed* or *inveterate* stage, remedies may perhaps relieve some of the attending symptoms, but will very seldom effect a cure. The patient, is not always totally deprived of sight, even in confirmed cases of long standing; but often retains a perception of light and shade, or a certain degree of capability to discern different gradations of light, certain colours, and even objects well illuminated or strongly contrasted.

In *complete* amaurosis, the patient is unable to distinguish any object or colour whatever, and is often insensible even to the presence of light. Any degree less than this is *incomplete.*

VI. *Diagnosis.* It is chiefly with incipient cataract that amaurosis is apt to be confounded. On this subject, I must refer to what has been said at page 636.

Glaucoma is often mistaken for amaurosis, from the circumstance of being always attended by some of the subjective symptoms of this

disease; but the objective symptoms of glaucoma, such as the apparent greenness of the humours, and the hardness of the eyeball, are sufficiently remarkable, to enable us, in general, to distinguish it from simple amaurosis. The complication, however, of amaurosis with glaucoma is extremely common. Amaurosis also occurs in combination with cataract; and in this case, glaucoma is generally superadded.

VII. *Prognosis.* There is scarcely any disease in which the prognosis is on the whole so unfavourable as in amaurosis. When the complaint, indeed, is recent, its cause evident, and the subject under middle life, a complete cure is not unfrequently obtained. This is sometimes the case even when the loss of sight is total. Much more frequently a partial amelioration only is effected; the disease being checked, and a share of vision preserved. In confirmed cases, it rarely happens that much improvement takes place, even under the best directed treatment.

It is only when the disease is not yet complicated with any material disorganization, that amaurosis yields to treatment. But in the cases which do yield, the degree of the disease is not always slight, but often serious, and the attack not always recent, but often of considerable standing. It is chiefly in cases of an inflammatory or congestive nature, that the disease is overcome.

A sudden amaurosis is generally less unfavourable than one which has developed itself slowly. When the pupil is only slightly dilated, still moveable, and of its natural form, the consistence of the eyeball neither firmer nor softer than in health, and no glaucoma present, we may pronounce a more favourable prognosis than when the pupil is fixed in the state either of expansion or contraction, the eyeball either boggy or of preternatural hardness, or the interior of the eye presents a greenish opacity. If the attack has been sudden, a want of power in the muscles of the eyeball or eyelids, along with the proper amaurotic symptoms, may be regarded as a sign, that the cause of the disease is some general pressure within the cranium, which energetic measures will probably remove; whereas the slow succession of one amaurotic and paralytic symptom after another is more likely to arise from the progress of some incurable formation within the head.

Amaurosis in middle age is less unfavourable than it is in childhood or in old age; it is less unfavourable if the attack is acute than if it were chronic; the prognosis is bad, if the disease is hereditary, or complicated with epilepsy, or if the patient, when a child, suffered from scrofula. Complicated with cataract, amaurosis is incurable.

The following case, by Dr Burrows, illustrates the fact of a recovery from complete amaurosis, under very unfavourable circumstances.

Case 284.—Miss ——, aged 24, of a scrofulous habit, fair complexion, and very cheerful and lively disposition, was suddenly attacked with pain in her head and slight fever, her bowels having been previously much constipated, and menstruation irregular in quantity. The pupils of the eyes were contracted, there was great susceptibility to light, and the pulse was quick.

The cerebral symptoms did not yield to the means used, and in a few days slight delirium followed. The fever subsided in about a fortnight, and the pulse became slow but unequal. The pupils now became excessively dilated, fixed, and insensible to the rays even of the sun. A complete state of fatuity rapidly followed. The powers of sensation and volition were suspended; the patient was insensible to the calls of nature; if solid food was put into her mouth, she did not masticate it or retain it. All her nutriment was given, therefore, in a liquid form, of which she would swallow a part when conveyed far into the mouth with a spoon. She neither spoke nor walked except when led. In fact she was a mere automaton.

After continuing in this state four months without the least variation, she suddenly exhibited signs of amendment. The first favourable symptom was the instant return of sight; consciousness soon followed; and every function, corporeal and mental, was so rapidly resumed, that at the end of 14 days from the restoration of her sight, she was in full possession of all her faculties.

Eleven years had elapsed, when Dr Burrows published the case, without any recurrence of the symptoms.

The treatment consisted in local abstraction of blood, by alternately cupping on the occiput, and by leeches behind the ears, which were repeated six times, with intervals of eight or ten days. Blisters were applied to the nape of the neck, and afterwards a seton was introduced and continued. She used the warm bath, and was purged briskly twice or thrice a-week. She took mercury as an alterative for two months, gradually increasing the dose, and the tincture of digitalis thrice a-day, commencing with fifteen, and ending with forty minims. At the same time, she was well supported by abundant nourishment.[21]

VIII. *Treatment.* It is evident, that in the treatment of any amaurotic affection, it should be our first object, to discover the efficient cause or causes upon which it depends, and then to attack these by appropriate remedies. As the causes are very various, and even opposite, so must also be the means of cure. In every case, however, to avoid the operation of the exciting causes, and to give the diseased organs rest, must be important. I sometime ago attended a gentleman affected with such a degree of incomplete amaurosis, that he could not read an ordinary type. He refused all medical applications, and simply shaded the eyes, and did not employ them on minute objects. In the course of twelve months, he perfectly recovered.

The means of cure may be arranged in two classes, *general* and *local*.

Attention must be directed, in the first place, to the general state of the health. It would be inconsiderate indeed, to attempt the removal of amaurosis by local applications, so long as any general disorder existed, such as one of the circulating system, or of the digestive organs.

I. General Means. 1. *Depletion.* When we find that an amaurotic attack is attended by signs of inflammation within the cranium, impeded circulation through the brain, or what is styled a determination of blood to the head, such as headach, vertigo, flushed countenance, photopsia, tinnitus aurium, and arterial throbbing of the temples, and that the pulse is full, and the subject young or plethoric, we will of course employ general and topical blood-letting, purge the patient, put him on low diet, and direct him to avoid all mental or corporeal excitement. It is not in cases of increased vascular action alone that depletion is useful, but also in cases of mere congestion.

If the case is purely one of pressure on the brain, from vascular distention, these means, conjoined with rest, will probably effect a cure. If along with vascular pressure, there is effusion, or even some morbid formation within the cranium, still depletion will afford in a plethoric subject the most effectual palliative relief, and act as the best preparative for other remedies, especially for the use of mercury. It is impossible to lay down any general rule regarding the point to which the bleeding and purging plan is to be carried in the treatment of amaurosis with plethora. We must equally beware of stopping short before our purpose is obtained, and the balance of the circulation restored, and of pushing the depletion so far that it becomes merely a means of weakening the patient, without promoting the cure.

2. *Mercury* has long and justly maintained a high character as a remedy in amaurosis.[22] It is probable that it aids in the cure chiefly as a sorbefacient, promoting, in particular, the removal of effusions within the cranium, and sometimes even of morbid formations. It cannot be doubted, that many of the disordered states of the optic apparatus, which end in amaurosis, are originally of an inflammatory nature; chronic inflammation of the retina and optic nerve is often the cause of the disease, and in all such cases, there is reason to believe, from what we know of the beneficial effects of mercury in other inflammatory affections of the organ of vision, that this medicine will prove more serviceable than almost any other remedy. There are of course, cases of amaurosis, in which from the sunken state of the patient's constitution, it might prove injurious to employ mercury; neither will it always be necessary or proper, in those cases in which we judge it right to try this remedy, to salivate the patient, although in some, only salivation, continued for several weeks, will effect a cure. Mr Travers, speaking of mercury in amaurosis, says, "I have been witness to its power in suddenly arresting the disease in too many instances, not to entertain a far higher opinion of it than of any other article of the materia medica."[23] Mr Lawrence's testimony is not less explicit. "We must have recourse" says he, "to mercury, which appears to be as decidedly beneficial in these cases, as in iritis, or general internal inflammation." "When the antiphlogistic treatment" he adds, "and a fair trial of mercury have failed, I do not know that it is possible to effect any further essential good by other means."[24]

3. *Iodine.* In adults, the preparations of iodine have proved in my hands inefficacious; but in children their sorbefacient effects have been highly advantageous.

4. *Emetics and nauseants.* That emetics should be useful in cases of amaurosis depending on gastric derangement, and that nauseants may sometimes prove serviceable, appears highly probable. Accordingly we find, that in recent incomplete amaurosis, arising from irritation in the digestive organs, Schmucker,[25] Richter,[26] and Scarpa[27] derived the best effects from the emetic plan of cure; and although Beer, and several later observers, have been less successful in its

employment, it still deserves attention. That it is not calculated, more than any other means of cure, for general adoption, and that, in some cases, it might even prove decidedly hurtful, can form no objection to its use, where the tongue is foul, the mouth bitter, and the patient complaining of continual nausea, without being either greatly debilitated, or, on the other hand, plethoric, and inclined to cerebral congestion.

The following is the emetic plan, as laid down by Scarpa. For an adult, dissolve three grains of tartarised antimony in four ounces of water, of which give two table-spoonfuls every half hour, till it produces nausea and copious vomiting. Next day the patient is to begin the use of a resolvent powder, composed of one ounce of cream of tartar, with one grain of tartarised antimony, divided into six equal parts, of which one is to be taken in the morning, another four hours after, and a third in the evening; and this to be repeated during eight or ten successive days. The effects will be slight nausea, purging, and perhaps vomiting. If, during the use of the resolvent powder, the patient is troubled with ineffectual efforts to vomit, want of appetite, &c. without any amendment in vision, the emetic is to be repeated; and even a third and fourth time, if it seems necessary. The stomach being by these means cleared, the patient is to begin the use of the resolvent pills of Schmucker,[28] or of Richter.[29]

Scarpa states the following to be the consequences usually observed to result from this treatment. The patient after having vomited copiously, feels more easy and comfortable. Sometimes the very day he has taken the emetic, he begins to distinguish surrounding objects; in other cases, this advantage is not obtained till the fifth, seventh, or tenth day; and in others, not till some weeks after the uninterrupted use of the resolvent powders or pills. The cure is seldom effected in less than a month, and is aided by such local remedies as are calculated to excite the languid action of the nerves of the eye.

5. *Evacuants*, of different sorts, besides those already mentioned, are required in the treatment of certain varieties of amaurosis; such as *emmenagogues*, when the disease appears to be connected with impeded menstruation; *anthelmintics*, when it arises from worms; *diaphoretics*, when suppressed perspiration is the cause.

6. *Tonics*, such as cinchona, and the preparations of iron, form a class of medicines of great importance in the treatment of amaurosis. That this disease in many instances takes its origin in vascular exhaustion and nervous debility, and is corrected, or entirely removed, by the use of a nourishing diet, the cold bath, tonic medicines, and influences of a similar sort, must be well known to all who have had any considerable experience in the treatment of eye-diseases, and whose opinions are not warped by some particular hypothesis, which leads them perhaps to regard amaurosis as always depending on one kind of cause, and therefore to be cured only by one plan of treatment. It cannot be denied, that tonics would, in many cases, do

harm, just as bleeding, purging, vomiting, or the use of mercury would do, if misapplied; but this is no reason why they should be indiscriminately rejected.

Many cases of amaurosis are benefited by local derivatives, such as leeches to the temples and blisters behind the ears, conjointly with the administration of general tonics. In cases with debility, Beer accused tonics, such as calamus aromaticus, cinchona, and steel, of aggravating the amaurosis, by producing an increased determination of blood to the eyes. But if the digestive functions are properly regulated, and topical derivatives employed, tonics will, in general, be found to be advantageous to amaurotic patients of feeble habits.[30]

7. *Stimulants.* Many and various internal stimulants have been employed in the treatment of amaurosis; most of them quite empirically, or on some vague idea of their possessing a power of rousing the sunken sensibility of the nerves; others, again on the ground of their evidently exciting violent convulsions, which, of course, they are enabled to do only through the instrumentality of the nervous system. Camphor and nux vomica may be mentioned, as examples of this class of remedies for amaurosis. It is well known, that those substances, given in considerable doses, excite violent tetanic paroxysms, not only in the parts animated by the spinal nerves, but also in the muscles of the face, eyes, and eyelids. In the hope, perhaps, that they might also produce a stimulating effect on the nerves of sense, these substances, and especially strychnia, (the alkaloid contained in the nux vomica, and one of the most energetic of poisons,) have been used internally as well as externally for the cure of amaurosis. Arnica montana, helleborus niger, naphtha, phosphorus, and a host of other drugs, of similar properties, have been given on the same principle; but it is extremely doubtful if they have been productive of the least good effect.

8. *Antispasmodics*, as opium, musk, valerian, and the like, have occasionally been used in the treatment of amaurosis, especially when this disease has been connected with epilepsy.

9. *Sedatives*, as belladonna, hyosciamus, and aconitum, have been tried; and I have known the first mentioned of these useful, in cases where the amaurotic symptoms were attended with nervous pain, affecting the branches of the fifth pair.

II. Local Means. 1. *Counter-irritation*, excited by rubefacient liniments, tartar emetic ointment, blisters, and issues, proves highly useful in almost every variety of amaurosis. A succession of blisters over the head is one of the most efficient modes of employing counter-irritation. Much advantage is also derived from stimulating friction of the forehead and temples, blisters behind the ears, or to the nape of the neck, caustic issues in the same place, or behind the angle of the jaw, a seton in the neck, a tartar emetic eruption between the shoulders, and sometimes even by still more remote applications of the same sort, as the immersion of the feet in warm water holding in suspension a quantity of powdered mustard. Magendie recommends the application of blisters and moxæ as close as possible to some

branch of the fifth nerve. Many facts, he says, testify the efficacy of moxæ to the temples. Dr Prichard recommends[31] an issue made by dividing the scalp with the knife from the summit of the forehead to the occiput, and filling the space with peas, as by far the most important method of counter-irritation. He relates a case of complete amaurosis, in which an issue of this sort was efficacious after bleeding, blistering, and mercurial salivation had failed. Small blisters to the forehead and temple, the raw surface being daily dusted with strychnia, are often employed; but I must confess that I have not witnessed any effect which could fairly be attributed to the strychnia. I must say the same with regard to friction round the orbit, with an alcoholic solution of veratria. That recoveries have followed the use of external stimulants, as strychnia and veratria, is not to be doubted; but that these substances exercise any specific effect, different from simple irritation, is extremely problematical.

2. *Sternutatories* have been used with some advantage, especially in cases where the mucous secretion from the conjunctiva and Schneiderian membrane, appeared to be partially suppressed. Mr Ware has published[32] a considerable number of cases, in which the chief means of cure was a mercurial snuff. He recommends one grain of turpeth mineral to be mixed with twenty grains of powder of liquorice, and about a fourth of this to be snuffed up the nose two or three times a-day. In cases where the nostrils are particularly dry, the patient may promote the efficacy of the sternutatory, by previously inhaling the steam of warm water through the nostrils.

3. *Stimulating vapours*, directed against the eyes, have been recommended, especially in cases where there are evident signs of great local debility, without any appearances of congestion or plethora. A little sulphuric ether, or aqua ammoniæ, may be poured into the palm of the hand, and held under the eyes till the fluid has evaporated; and this may be repeated several times daily.

4. *Electricity* and *Galvanism* are likely to be useful only in cases of a torpid character, and free from excitement. They would be hazardous, if inflammation were present, or if they excited pain.

Electricity formerly enjoyed a considerable reputation as a remedy in amaurosis, but of late years has been very much neglected. As it is not likely to be trusted to, nor even tried, while the disease is recent, it is not to be wondered at that it should, like every other kind of remedy, prove totally inert in a great majority of the confirmed or inveterate cases, which, as to a last resource, may be submitted to its influence. The cases related by Mr Hey[33] and Mr Ware,[34] afford sufficient ground for believing that electricity may occasionally prove highly serviceable. Mr Ware considers it more useful in amaurosis arising from the effect of lightning on the eyes, than in any other variety of the complaint. The mode of application is chiefly by directing the electric aura against the eyes, drawing it from them during the insulation of the patient, and sometimes by taking small sparks from the eyelids and integuments round the orbits.

Galvanism has been much lauded by Magendie. He says that in complete amaurosis, the only result from the galvanic current is that of rendering the patient indistinctly sensible to the presence of light during the experiment; but in incomplete amaurosis, galvanism, applied to the branches of the fifth nerve, has sometimes produced a perfect cure. He employs electro-puncture. This is done by passing down fine needles through any of the branches of the frontal and superior maxillary nerves; a slight pricking sensation indicates that the nerve is pierced; a galvanic current is then passed along the needles, through the branches of the fifth nerve.

The general review which we have thus taken of the seat, causes, symptoms, and treatment of amaurosis, is sufficient to show that the subject is surrounded with difficulties, and that there is a necessity for exercising the most minute and careful observation, if we hope to make any advancement in the knowledge of this class of diseases. Each individual case of amaurosis, to do it justice, would require to be considered at leisure, and in all its bearings—to be made, in fact, a subject of study. It is but too evident, that many who have written upon amaurosis, labouring probably under a distaste for what they had found to be an irksome task, namely, the investigation of complicated phenomena, have endeavoured to cut the matter short, and introduce, into a subject which does not admit of it, some easy simple arrangement of their own. Feeling themselves unable to grapple with the infinite diversities of this class of diseases, they have endeavoured to reduce the phenomena of amaurosis to some contracted notions of their own, and satisfying themselves with a few artificial distinctions, have actually discouraged the attempt to follow nature with that perseverance, without which, in a subject like this, no real progress can be made.

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[1] From ἀμαυρὸς, *obscure*. Ἀμβλυωπία of Hippocrates. Μιλανία of Aristotle. *Gutta serena* of the Arabians. *Der schwarze Staar* of the Germans.

[2] Josephus et Carolus Wenzel de Penitiori Structura Cerebri, p. 334; Tab. vi. fig. 2; Tubingæ, 1812. Cloquet, Pathologie Chirurgicale, p. 131; Pl. x. fig. 3; Paris, 1831.

[3] Anatomy of the Brain, p. 80; London, 1826.

[4] Collections from the unpublished Medical Writings of C. H. Parry, M.D; Vol. i. p. 304; London, 1825.

[5] See Bright's Reports of Medical Cases, Vol. ii. pp. 292, 615, 620; London, 1831. Andral, Clinique Médicale, Tome v. pp. 338, 483; Paris, 1833.

[6] Zeitschrift für Physiologie, Vol. i. p. 255; Heidelberg, 1824.

[7] Ribes, Mémoires de la Société Médicale d'Émulation, Tome vii. p. 99; Paris, 1811.

[8] Magendie, Journal de Physiologie, Tome iii. p. 376; Paris, 1823. Serres, Anatomie Comparée du Cerveau, Tome i. p. 331; Paris, 1827.

[9] Magendie, Journal de Physiologie, Tome iv. pp. 186, 302; Paris, 1824. Desmoulins, Anatomie des Systèmes Nerveux, Tome ii. p. 712; Paris, 1825.

[10] Mayo's Anatomical and Physiological Commentaries, No. ii. p. 4; London, 1823.

[11] Mémoires de l'Académie Royale des Sciences, 1727, p. 1; Amsterdam, 1733.

[12] Institutes of Surgery, Vol. i. p. 167; Edinburgh, 1838.

[13] 'Id utique adparet, plerumque in mentis vitiis encephalum pati: et si aliquando 'rariori exemplo non visum est pati, potuit vitium in minoribus elementis latuisse,

' aut incisori patientia defuisse.' Haller, Elementa Physiologiæ, Tom. v. p. 574; Lausannæ, 1763.

[14] Lehre von den Augenkrankheiten, Vol. ii. p. 443; Wien, 1817.

[15] Anfangsgründe der Wundarzneykunst, Vol. iii. p. 423; Göttingen, 1804.

[16] Janin, Mémoires et Observations sur l'Œil, p. 426; Lyon, 1772.

[17] Travers' Synopsis of the Diseases of the Eye, p. 188; London, 1820.

[18] Ibid.

[19] See Andral, Clinique Médicale, Tome v. pp. 682, 693, 710; Paris, 1833.

[20] Bennet's Inaugural Dissertation on the Physiology and Pathology of the Brain, p. 56; Edinburgh, 1837.

[21] Burrows' Commentaries on Insanity, p. 491; London, 1828.

[22] Medical Works of Richard Mead, M.D. pp. 204, 536; London, 1762. Heister de Cataracta, Glaucomate, et Amaurosi, p. 331; Altorfii, 1713.

[23] Op. Cit. p. 305.

[24] Lectures in the Lancet, Vol. x. p. 578; London, 1826.

[25] Vermischte Chirurgische Schriften, Vol. ii. p. 3; Berlin, 1786.

[26] Op. Cit; Vol. iii. p. 443.

[27] Trattato delle principali Malattie degli Occhi, Vol. ii. pp. 227, 230; Pavia, 1816.

[28] ℞ Gummi-resinæ Sagapeni, Gummi-resinæ Bubonis Galbani, Saponis Veneti, āā ʒi. Rhei optimi ʒiss. Tartratis Antimonii, gr. xvi. Succi Liquiritiæ ʒi. Fiat massa, in pilulas formanda, singulas granum i pendentes.

Fifteen to be taken morning and evening, for a month or six weeks.

[29] ℞ Gummi-resinæ Ammoniaci, Gummi-resinæ Assæfœtidæ, Saponis Veneti, Radicis Valerianæ subtilissime pulverisatæ, Summitatum Arnicæ, āā ʒii. Tartratis Antimonii gr. xviij. Fiat massa, in pilulas formanda singulas grana ii pendentes.

Fifteen to be taken thrice a-day, for some weeks.

[30] Edwards, in Lancet, 3 Nov. 1838, p. 227.

[31] Report of the Sixth Meeting of the British Association for the Advancement of Science; Transactions of the Sections, p. 107; London, 1837.

[32] Observations on the Cataract and Gutta Serena, pp. 407, 410, 417, &c. London, 1812.

[33] Medical Observations and Inquiries, Vol. v. p. 1; London, 1776.

[34] Op. Cit. pp. 379, 381, &c.

SECTION II.—CLASSIFICATIONS OF THE AMAUROSES.

Some will have no classification; but insist that amaurosis is always one and the same. Others have adopted the division, already noticed, into functional and organic, whereas every case of amaurosis is both. Mead divided the varieties of amaurosis into inflammatory, paralytic, and those which arise from pressure. Rosas recognizes three great classes; viz. the erethic, the congestive, and the torpid. Beer has classified the different species according to their symptoms; and it may not be improper to examine his classification somewhat more particularly. The principle is evidently good; determining the seat and nature of the disease, by the particular symptoms present.

Beer admits four classes: the *first* including amaurosis, characterized only by subjective symptoms, or, in other words, by impaired vision, without any diseased appearances in the organ of vision; the *second*, amaurosis characterized not only by impaired vision, but by

changes in the texture of some part of the optic apparatus; the *third*, amaurosis characterized by impaired vision, with changes in the form and activity of some part of the optic apparatus; and the *fourth*, amaurosis in which the characteristics of the first three classes are combined.

It does not admit of denial, that we occasionally meet with cases of amaurosis, presenting such differences in the symptoms, as Beer has chosen for the ground-work of his classification. For instance, it sometimes happens that in the amaurosis from exhaustion, there is scarcely an objective symptom to be discovered about the eye, and we are obliged to admit the existence of the disease almost solely on the testimony of the patient, the case evidently falling within Beer's first class. The only instance which Beer has introduced into his second class, as characterized by loss of vision, with change in texture, is amaurosis depending on absorption of the pigmentum nigrum. Hydrocephalic amaurosis very frequently presents no other symptom than loss of sight, and fixed dilated pupil, so that it is referrible to Beer's third class. Amaurosis, again, from an injury of the eye, is often attended, in addition to loss of sight, by irregular immovable pupil, laceration of the tunics, and enlargement, or, on the contrary, atrophy of the eyeball. Such a case will undoubtedly belong to the fourth class. I trust, however, that I shall not be accused of rashness, nor of disrespect for the labours of Professor Beer, when I state my belief, that the cases arranged under his four classes, are not uniformly attended by the symptoms which he has assigned to them; but that those species of amaurosis, which he has set down as characterized by subjective symptoms only, are sometimes attended by objective signs also, while, on the other hand, those changes in the texture and form of certain parts of the optic apparatus, which he has considered as characteristic of other species, are sometimes merely coincident, and not essential. The amaurosis, for example, which originates from over-excitement of the eye, or from plethora, which Beer places in his first class, is often attended by fixed dilated pupil, a circumstance which should assign it a place in the third class. The amaurosis from rage, is merely a variety of the plethoric or apoplectic, and may or may not present the glaucomatous appearance of the humours, on account of which he has placed it in his fourth class.

Glaucoma, one of the changes upon which Beer has founded his classification, is by no means an essential part of any amaurosis. Neither is fixed dilated pupil any thing more than a frequent coincidence. In the hydrocephalic amaurosis, for instance, the pupil, though generally expanded and motionless, is not always so. It must, therefore, evidently form an insuperable objection to any classification founded on symptoms, that sometimes they are, and at other times they are not present.

Beer admits as species, an epileptic, and a paralytic amaurosis; whereas the epilepsy and amaurosis in the one case, and the palsy and amaurosis in the other, ought to be regarded not as standing in

the relation of cause and effect, but merely as coincident effects, arising from one and the same cause, namely, some morbid change or formation within the cranium.

While Beer's classes refer to the appearances presented in different cases, his distinctions of species are founded, in general, on the causes, efficient or remote, of the disease.

The following is a classification of the principal varieties of amaurosis, arranged according as the retina, optic nerve, and encephalon suffer from the efficient causes of the disease. Under the term *encephalon* the optic nerves are included, from their origin to the foramina optica.

I. RETINA.

I. PRESSURE ON THE RETINA.

I. Pressure on the convex surface of the retina.

1. Subsclerotic dropsy. (See p. 593.)
2. Inflammation and thickening of the choroid. (See p. 489.)
3. Subchoroid dropsy. (See p. 593.)

II. Pressure on the concave surface of the retina.

1. Vitreous dropsy. (See p. 595.)
2. Displaced crystalline lens. (See p. 679.)
3. Varicosity of the retinal blood-vessels. (See p. 812.)
4. Apoplexy of the retina.

II. STRUCTURAL CHANGES IN THE RETINA.

1. Wounds of the retina. (See pp. 344, 348.)
2. Concussion and laceration of the retina. (See p. 346.)
3. Retinitis, acute and chronic. (See p. 497.)
4. Hypertrophy of the retina.
5. Atrophy of the retina.
6. Ramollissement of the retina.
7. Neuromata of the retina.
8. Melanosis of the retina.
9. Ossification of the retina. (See p. 579.)

II. OPTIC NERVE.

I. PRESSURE ON THE OPTIC NERVE.

I. Pressure by orbital diseases.

1. Exostosis of the orbit. (See p. 47.)
2. Sarcomatous and encysted tumours in the orbit. (See p. 304.)
3. Aneurism by anastomosis in the orbit. (See p. 322.)

II. Pressure more immediately affecting the optic nerve.

1. Aneurism of the arteria centralis retinæ.
2. Tumours attached to or contained within the envelopes of the optic nerve.

II. STRUCTURAL CHANGES IN THE OPTIC NERVE.

1. Wounds of the optic nerve. (See pp. 18, 294, 350.)
2. Inflammation of the optic nerve.
3. Hypertrophy and general or partial induration of the optic nerve.
4. Atrophy of the optic nerve.

5. Fungus hæmatodes of the optic nerve. (See pp. 616, 617.)
6. Melanosis of the optic nerve. (See p. 623.)

III. ENCEPHALON.

I. PRESSURE ON THE ENCEPHALON.

1. Fractured and depressed cranium.
2. Hyperostosis or thickening of the cranium.
3. Exostosis of the inner table of the cranium.
4. Fungous, osseous, and other tumours of the dura mater. (See p. 77.)
5. Congestion of the encephalic blood-vessels.
6. Apoplexy, from encephalic hæmorrhagy, &c.
7. Aneurism of the encephalic arteries.
8. Enlarged pituitary gland.

II. STRUCTURAL CHANGES IN THE ENCEPHALON.

1. Injuries of the encephalon, in wounds through the orbit, (see p. 6,) in fractures with depression, in gunshot wounds, (see p. 21,) &c.
2. Concussion and laceration of the brain.
3. Inflammation of the membranes of the brain, producing adhesions, thickening, depositions of serum, lymph, pus, &c.
4. Inflammation of the brain.
5. Abscess in the brain.
6. Ramollissement of the brain.
7. Induration or scirrhus of the brain.
8. Hypertrophy of the brain.
9. Atrophy of the brain.
10. Hydrocephalus, superficial and ventricular.
11. Enlarged pineal gland.
12. Scrofulous tubercles in the brain.
13. Encysted tumours in the brain.
14. Cartilaginous, osseous, and other tumours in the brain; fungus hæmatodes, melanosis, &c.

Those species of amaurosis to which references are attached, have already been considered, and do not require to be brought under review. Neither is it necessary to treat formally of all the remaining species. Hypertrophy, atrophy, and ramollissement of the retina, are consequences of retinitis, the existence of which, in conjunction with amaurosis, is established by dissection, but it would be superfluous to consider these states separately, because we are at present ignorant of any diagnostic signs, by which, during life, the one can be discriminated from the other. Neuromata, or small reddish and whitish tubercles, imbedded in the medullary substance of the retina, and melanosis, or minute black spots dispersed on its concave surface, are also morbid states, which dissection has shown to co-exist with amaurosis, but regarding which we possess scarcely any farther information.

In many instances of amaurosis, there is reason, both from the

nature of the exciting cause and from the symptoms, to conclude that the disease affects the whole nervous optic apparatus—retina, optic nerve, and portion of the brain in connexion with the optic nerve. This is especially the case when the disease is of the inflammatory or congestive kind. The following may prove exciting causes of congestion or inflammation of the nervous optic apparatus; some of them operating directly or locally, others indirectly or sympathetically. When the cause is indirect or sympathetic, the transference of disease from the remote organ, such as the stomach or the uterus, is in some cases sudden and in others slow.

1. Intense light.
2. A stroke of lightning.
3. Over-exercise of the sight.
4. Irritation from teething, worms, disordered bowels, &c. as, in the inflammation of the brain in children, called acute hydrocephalus.
5. Febrile diseases; as, continued fever, scarlatina, measles, &c.
6. Passions of the mind; as, rage, grief, fear, &c.
7. Insolation, or *coup de soleil.*
8. Suppressed evacuations; as, of the menses, hæmorrhoids, milk, mucus of the Schneiderian membrane, purulent matter of ulcers, &c.
9. Suppressed eruptions, acute or chronic.
10. Cold, and suppressed perspiration.
11. Narcotic and other poisons.
12. Disorders of the digestive organs, acute or chronic.
13. Continued loss of the fluids of the body; as, in protracted suckling, onanism, &c.
14. Affections of the fifth nerve; as, irritation, wounds (see p. 116), and morbid changes within the cranium (see p. 835).

Those only who have attempted to classify the causes of amaurosis can form an estimate of the difficulties attached to the subject. Considerable difficulty arises from the fact, that the nature of many of the causes is of a mixed kind; they are structural changes, for example, of some portion of the encephalon, and yet they operate on the optic apparatus chiefly by mechanical pressure. Hydrocephalus, and the various sorts of tumours which form in the brain, are instances of such cases.

SECTION III.—ILLUSTRATIONS OF SOME OF THE SPECIES OF AMAUROSIS.

§ 1. *Amaurosis from apoplexy of the retina.*

By apoplexy of the retina is understood[1] a morbid condition of that membrane, in which its blood-vessels becoming suddenly distended, or actually ruptured, its nervous substance is thereby compressed, and its sensorial power diminished or abolished.

A suppression of the natural excretions of the body, and various other causes of determination of blood to the head and eyes, are supposed to give rise not unfrequently to affections of the vessels of the retina, and thereby to amaurosis. Chronic affections of this sort, however, are to be distinguished from those which are sudden, and the latter only are to be accounted apoplectic. The latter are likely to be promptly removed, and vision restored, by blood-letting, while the amaurosis depending on chronic distension of the retinal vessels derives no benefit from that practice.

The causes of apoplexy of the retina are generally violent, and operate either in causing a sudden flow of blood towards the head and eyes, or in impeding its return. A fatiguing journey under the scorching heat of the sun, a sudden suppression of the menstrual discharge, and the like, are apt to produce such an effect.

The suddenness of the amaurotic attack, without any pre-existing amblyopia, with flushing and turgescence of the vessels of the face, a full slow pulse, and vertigo, will generally render the diagnosis distinct. Should apoplexy of the brain occur at the same time, the diagnosis will be obscured; for blood effused in the brain, may produce incurable amaurosis, although the retina is little affected.

If the vessels of the retina are merely over-distended, but not ruptured, a cessation of the cause, and the employment of blood-letting may completely remove the amaurosis. But if a blow on the eye, strangulation, or any other cause, has produced rupture of the retinal blood-vessels, the total or partial amaurosis hence arising, being produced by blood extravasated between the retina and the vitreous body, and partly imbibed by the latter, can yield only as the blood is absorbed, which is generally accomplished very slowly.

§ 2. *Amaurosis from aneurism of the arteria centralis retinæ.*

It was an ingenious conjecture of Mr Ware, that dilatation of the central artery of the optic nerve might sometimes be the cause of amaurosis. He had often suspected that this might be the cause, in those instances where the disease came on suddenly, and in which, though all objects placed directly before the eyes are totally invisible, there remains some small sense of light, so as to give a confused perception of objects sidewise.

The conjecture is so far confirmed by a pathological preparation, in the possession of Professor Schmiedler of Friburg, viz. an aneurism of the central artery of each retina, taken from a princess of Baden, who was long blind, and to whom Plenck, Richter, and the first surgeons of Germany, had been called. She only saw a little on looking downwards. The aneurism compressed the optic nerves.[2]

A similar case is recorded by Gräfe.[3] The patient was a female, who lost her sight under the symptoms of photophobia and feeling of pulsation in the orbit. The central artery of the retina, within the optic nerve, was distended to the diameter of a stalk of grass, and the blood-vessels of the retina were varicose.

§ 3. *Amaurosis from tumours attached to or contained within the envelopes of the optic nerve.*

Mr Wardrop has given[4] a figure of a preparation, from Mr Heaviside's museum, in which a tumour appears in the neurilema of the optic nerve. No further history of the patient was known, than that he was amaurotic of the corresponding eye.

§ 4. *Amaurosis from structural changes in the optic nerves.*

That variety of amaurosis which arises from some morbid change in the substance, or in the sheath of the optic nerve, is, according to Beer, developed very slowly, and rarely in both eyes. It is attended by the sensation of a black cloud, which seems gradually to become more and more dense, and by such a degree of visus defiguratus as is extremely distressing to the patient. He rarely complains of much pain, either in the eye or head, but only of a feeling of obtuse pressure in the posterior part of the orbit, although not the slightest degree of projection of the eyeball is to be observed. Even at the very commencement, the pupil is extremely enlarged, the iris completely immovable, and the pupillary edge irregular. Glaucoma takes place, and is followed by glaucomatous cataract, unaccompanied, however, by any varicose state of the blood-vessels of the eye. At last, the eyeball becomes sensibly smaller than natural.

The following are some of the morbid changes which have been detected on dissection; induration of the optic nerve, unnatural adhesion between it and its sheath, the medullary substance of the nerve ash-coloured and wasted, hydatids between the nerve and its sheath, calculous concretions within the sheath. Most of these changes are, no doubt, the results of chronic inflammation, such as may arise from a great variety of causes.

As it is fully established, that destruction of the eye frequently leads to atrophy and other diseased states of the optic nerve, it is necessary always to ascertain, in our dissections, whether the case before us has been one of disorganization of the eye from inflammation, leading to atrophy of the optic nerve, or one of diseased nerve, leading to amaurosis and atrophy of the eye.

Case 285.—Mrs.——, aged 83, had been completely blind from amaurosis for 30 years before her decease in 1817. She had also been subject to irregular gout, which assumed a variety of forms, and some months before her death she was attacked with palsy of one side.

On opening the head, aqueous effusion was found below the tunica arachnoidea, and in both ventricles. One part of the cerebrum was observed to be of a pulpy texture, but these appearances were most probably connected with the recent paralytic attack, and not at all with the amaurotic. All the nerves, with the exception of the optic, had the usual appearance. On examining the membranous sheaths of these nerves, it was ascertained that their medullary matter had been completely removed. This change had taken place even nearer to the brain than where the nerves cross each other. The arteries of the brain were in most parts altered in their structure; their coats were speckled with white spots, and their texture was more rigid and firm than natural. Both the carotids, where these vessels are in contact with the optic nerves at the foramina optica, were found to

be remarkably dilated, suggesting the idea that the absorption of the nerves was connected with the enlarged state of the arteries. The absorption, however, of the optic nerves nearer the brain could not be accounted for on this notion; so that it was not easy to conjecture whether the enlarged state of the vessels was the cause or the effect of the absorption of the optic nerves. A similar tendency to enlargement was noticed where the cerebral arteries enter the cranium, and perhaps it might have been traced in other situations, if a more minute search had been made.

The twin-sister of this lady died in her 81st year, and for eight or ten years before her death had been also completely amaurotic. Though her general health was more entire than is usual at such an advanced age, she had completely lost not only her sight, but also the sense of smell, taste, and hearing. She could not distinguish animal from vegetable food, nor one sort of fluid from another. No opportunity was obtained of inspection after death.

Dr Brown, who communicates these particulars to Dr Monteath, states, that the only daughter of Mrs —— was alive, and had been totally blind from amaurosis for several years, being then in her 56th year. Dr Monteath adds, that he had been consulted by the son and grandson of Mrs ——, both of whom had weak eyes. The grandson, in particular, had a very distressing degree of congenital amblyopia. Any exertion of his eyes induced temporary blindness, and though he could sometimes see a minute object, at other times he would walk directly against a table or a chair.[5]

Case 286.—A gentleman, aged 78, died under my care after having been completely amaurotic for several years. His pupils had retained their natural size, but were immovable. His lenses were glaucomatous. For some months before his death, he was occasionally troubled with spectral illusions, always of an agreeable cast. Debility, vertigo, and delirium succeeded, with headach, for which the application of leeches and blisters was used, with relief.

On dissection, the cranium was found to be very thick. There was a very copious serous effusion under the tunica arachnoidea, on the upper surface of the cerebrum. The lateral ventricles were very considerably distended with watery fluid. The thalami, on their upper surface, appeared small and corrugated. There was a pretty firm adhesion between the lower surface of the anterior lobes of the cerebrum and the upper surface of the optic nerves. The substance forming the adhesion felt gritty, as if from a deposit of calculous matter. The optic nerves were flat and atrophic, especially behind the chiasma, where they seemed entirely deficient in medullary substance. In fact, they were so wasted, that they could not be traced farther than the crura cerebri. They had a watery and membranous appearance. The corpora quadrigemina seemed to be natural. The brain was of moderate consistence. The basilar, vertebral, and some of the other arteries were in a cartilaginous state.

§ 5. *Amaurosis from fractured cranium with depression, or from sanguineous extravasation in consequence of injury.*

The insensibility attending pressure on the brain from these causes, may be more or less complete; for in some instances, the patient lies unconscious, indeed, of what is passing around him, but capable of being roused by strong impressions on his senses, while in other cases the loss of sense is so complete, that the skin may be pinched, a lighted candle held close to the eye, and the loudest sound applied to the ear, without any evident effect.

Where the cause of these symptoms is simply a fractured and depressed portion of the cranium, they show themselves immediately after the infliction of the injury; but where they depend on extravasation of blood, either accompanying fracture or independent of it, the collection of blood may form slowly, and a considerable interval of time elapse before the patient becomes insensible.

Sir B. C. Brodie[6] observes, that "it sometimes happens, that there is a destruction of sensibility in one part of the system, while the general sensibility is impaired only in a slight degree;" and he illustrates this remark by the following instance, in which the sensibility of the optic nerves was chiefly affected.

Case 287.—An old man, who had been run over by a cart, was admitted into St George's Hospital. There was a fracture with depression of one of the parietal bones. He was sensible, but slow in giving answers, and peevish, and it was observed that he was totally blind. Mr Gunning removed a portion of the parietal bone with the trephine, and elevated the depression; but the operation produced no change in the symptoms. About 36 hours after the accident, the pulse became frequent, and he was delirious. He remained entirely deprived of the faculty of vision; believing that he saw imaginary objects, but totally unconscious of the existence of those actually before his eyes. At the expiration of the fifth day, he died.

On examining the body, the membranes of the brain were found inflamed, and smeared with pus and lymph. In the basis of the cranium there was a transverse fracture extending across the sphenoid, the fractured edges being displaced in such a manner as to press on the optic nerves immediately behind the orbits, and to explain, in the most satisfactory manner, the total loss of sight.

Prognosis. Among those who recover from fractured skull with depression, or from extravasation of blood within the cranium in consequence of an injury of the head, there are some in whom the symptoms wholly subside in the course of a few days, and others in whom certain remains of one or more of the symptoms still exist after the lapse of many years. Such variety in restoration is remarkably the case with regard to the sentient power of the eye, the mobility of the pupil, and the activity of the muscles supplied by the third pair of nerves.

Treatment. It is unnecessary to say any thing here on the surgical treatment of fractured cranium with depression. The medical means most likely to assist in restoring vision in such cases, are rest, abstinence, blood-letting, laxatives, and, after a time, an alterative course of mercury. Benefit will also be derived from keeping up a continued discharge from the neighbourhood of the head.

§ 6. *Amaurosis from morbid changes in the membranes, or in the bones of the cranium.*

There are various states of the dura mater, and of the bones of the skull, capable of producing amaurosis; such as ossifications of the dura mater, especially when they are in the form of sharp spiculæ, and exostoses proceeding from the inner table of the skull. We have no means of positively ascertaining during life the existence of such organic changes.

The symptoms are exceedingly similar to those attendant on diseased formations in the brain. Severe cephalæa, pain in the top of the head, more of the special senses affected besides sight, stiffness in the limbs, followed by pain, and convulsions, are symptoms which lead to the suspicion of pressure on the basis of the brain, or on the pons Varolii. The symptoms increase for a time very slowly; first one eye is affected, then the other; then the organs of hearing. In many of the patients who labour under the present variety of

amaurosis, there takes place at last a protrusion of the eyes out of the orbits; a symptom indicative of great derangement in the bones forming the basis of the cranium, of the dura mater covering the sella Turcica, or of the upper part of the orbits. (See *Case* 93.)

The morbid changes of the bones, which induce amaurosis, are found chiefly in the basis of the cranium. In these cases, caries is sometimes met with, but much more frequently exostosis of different forms. In some instances, innumerable spiculæ of bone project into the cavity of the cranium, so sharp that they readily wound the finger. Beer preserved the skull of a lady, who had been totally blind, and for some weeks before her death, insensible, in which there was scarcely any part within the cranium which was not studded with sharp exostoses. In such cases, the bones are generally very thin, the diplöe being almost completely wanting. In an amaurotic boy, who, for a short time before his death, was insane, Beer found, on dissection, a spine, of considerable length, by the side of the sella Turcica, perforating the optic nerves at their junction.

Those who have suffered from rachitis in youth, from syphilis, or from gout in middle age, are more liable than others to thickening and other morbid changes in the bones of the cranium.

It is also worthy of remark, that in all the cases mentioned by Beer, it appears that the complaint in the head and eyes began after sudden cooling of the head, followed by rheumatism, which though slight in its commencement, had fixed itself in the fibrous covering of the skull.

The morbid formation, which I have ventured (page 93) to call *chloroma*, is found to affect in some cases the pericranium, in others the dura mater, and occasionally both these membranes at once. Such appears to be the nature of a peculiar set of cases described by Sir Everard Home, and attributed by him to the spread of inflammation from the dura mater to the pericranium. The cases in question were attended by the symptoms common to pressure on the brain from other causes, and amongst these by amaurosis, and were relieved by cutting down upon the cranium, so as to remove the tension of the parts covering it. In one fatal case of this kind, Sir Everard found the pericranium thickened into a mass of a fibrous bony texture; and corresponding to this part, internally, there was a similar thickening and induration of the dura mater. Most of the cases referred to had been treated by long courses of mercury without benefit, in some of them with aggravation of the symptoms.

The prognosis in amaurosis resulting from morbid changes in the membranes or bones of the head is, I need scarcely say, extremely unfavourable. The gradual development of complete blindness, and not only death, but a very mournful death, is to be dreaded. Nor does the healing art possess any means which can be effectually employed in diminishing, much less removing, the organic changes upon which the disease depends, except perhaps in one or two cases. These cases are when the symptoms evidently originate in some constitutional disorder, and especially in syphilis.

The following case, related by the late Mr Wilson, of London, shows what may sometimes be done, even in circumstances which might appear almost desperate.

Case 288.—In November 1806, Mr Wilson was requested by a surgeon of his acquaintance to visit a gentleman, who had been affected with a long and severe illness. Mr W. received the following account of the case.

In the spring of 1803, when influenza was very prevalent, Mr C. a muscular man, about 28 years of age, and of rather a sanguineous temperament, was attacked with a very severe deep-seated pain in the orbit of the left eye. A physician of eminence was consulted, by whom a rigidly antiphlogistic plan was recommended. This was persevered in for a considerable time without benefit. The case was then deemed nervous, and medicines adapted for the relief of nervous diseases were employed in large quantities. The patient was ordered to remove to Hampstead for the benefit of the air. This plan not succeeding, other medical opinions were taken, and various remedies tried; but the patient gradually became worse. The sense of hearing in the left ear was now totally lost. The levator of the left upper eyelid became paralyzed, and a great degree of strabismus was produced by the rectus externus having also lost its power. The pupil of the left eye became much and constantly dilated, and the sight of that eye was lost. The right angle of the mouth was permanently drawn to the right side. An extreme hoarseness took place, and his articulation became so indistinct that he could not be understood even by his friends. He lost the power of swallowing solids, and swallowed fluids with very great difficulty, as the attempt brought on a distressing sense of suffocation. A vessel was constantly placed at his side to receive the saliva, which he could neither swallow nor eject from his mouth, and which he therefore endeavoured to push out with his tongue. His bowels were most obstinately constipated, requiring the frequent use of drastic purges.

Upon visiting the patient, Mr Wilson found his right hand and arm folded up, and, with the leg of the same side, in a state of complete paralysis. Very violent pain in the orbit of the left eye still continued, and there was also considerable pain in the vertebræ of the neck, and at the top of the shoulder. When in bed he could not raise his head from the pillow; he could scarcely sleep at all, and had no respite from excruciating pain; in short, his dissolution was hourly expected. Mr W. learned also, that before the commencement of the disease, he had had at two or three different times, chancres and incipient buboes, and that for these he had used mercury, until the symptoms disappeared, and the surgeon who attended him pronounced his cure to be complete. In the summer preceding his illness, he had strained his back in leaping; a short time after which, a bubo formed in the right groin. This was particularly attended to, under the supposition that it might prove venereal. It suppurated and healed without mercury having been used.

Observing something particular in the figure of one of his legs, Mr Wilson requested leave to examine it; and when the stocking was removed, perceived a cicatrice of considerable extent, and that the tibia was much enlarged. The patient did not, however, feel any pain in this bone. He expressed in writing with his left hand, that several years before, he had received a severe blow on this leg, and that a large piece of bone had come away; he could not recollect whether he took any mercury at that time, and he did not think that his surgeon considered the disease in the bone as venereal. He did not remember having had, at any time, spots on his skin or a sore throat. His present ailment, he said, had never been considered, by any of the medical persons whom he had consulted, as venereal, nor had the use of mercury ever been proposed for its cure.

On examining his neck, Mr Wilson found several of the vertebræ much enlarged. He discovered also a large swelling in the acromion of the right scapula, and a considerable enlargement of the whole of the spine, and greater part of the superior costa, of that bone. As the muscles were wasted, a swelling was readily perceived in the os brachii, a little above the attachment of the deltoid muscle. The right clavicle possessed at least three times its usual thickness.

From the possibility of these swellings being venereal, Mr Wilson felt justified in proposing the immediate use of mercury. The patient's relations were appre-

apprehensive that his extreme weakness, and the apparently rapid approach of death, would render the experiment useless; but willingly consented to the attempt being made, as without something being done, and that quickly, death seemed inevitable.

Accordingly, one drachm of the strong mercurial ointment, with five grains of camphor, was rubbed upon his skin every night, and a seton was inserted in the back of his neck. In four days, his mouth became affected from the mercury: in ten days he swallowed with less difficulty; he slept well, and his pains were nearly gone. In a fortnight, the enlargement of the clavicle was evidently lessened, and his muscles were much fuller and firmer. He had also recovered his speech, so far as to make himself understood. The quantity of the ointment was now increased to a drachm night and morning, and the use of it was continued for eleven weeks; towards the latter part of which time, when he could swallow with ease, he took about eight ounces of the compound decoction of sarsaparilla daily, and now and then some preparation of Peruvian bark.

During this course, although the patient's mouth was affected with a considerable degree of soreness, he gathered health and strength daily, and before it was discontinued had grown fat. His muscles had acquired very nearly their original plumpness and strength, and the limbs their former capability of motion. The pains were wholly removed, and the thickening of the bones very much reduced. His power of swallowing and of moving the right extremities, seemed at first to increase, in the same proportion as the swellings of the cervical vertebræ diminished. But though these swellings afterwards became stationary, the powers of the muscles were completely restored. His cure, with the following exceptions, was perfect, and had remained so for more than two years. The pupil of the left eye continued more dilated than that of the right, and the eyelid could not be raised quite so high as formerly; but he could distinguish objects and colours in some measure with the left eye, and even small objects when he used plain green spectacles, and employed that eye only. When he used both eyes, his vision was confused, as he then saw objects double. He still spoke with a very hoarse voice, but his articulation was sufficiently distinct.[8]

Case 289.—Dr Abercrombie records[9] the case of a man, aged 47, whose complaints began in May 1816, with headach, and weight in the head, aggravated by stooping, and increasing gradually, notwithstanding copious evacuations. In August his sight began to fail, with giddiness; in September, he could see objects only in a very strong light; in December, perfect blindness, the pain still continuing constant and severe; in the middle of January, stupor and forgetfulness, followed; on the 31st of that month, by coma and death.

On dissection, a tumour, the size of a large egg, was found attached to the tentorium, in such a manner, that part lay above, and part below it; the falx likewise entering into its substance above. Internally it was firm, resembling somewhat the structure of the kidney. There were four ounces of fluid in the ventricles.

Case 290.—A person, whose sex and age are not mentioned, having for a long time been deprived of the sense of smell, and latterly of that of sight, died comatose.

On dissection, a tumour, which Professor Cruveilhier considered carcinomatous, was found to arise from the dura mater where it covers the upper surface of the ethmoid bone. The tumour (*Fig.* 108.) extended backwards a little upon the sella Turcica, and laterally on the roof of each orbit. It had a mammillated appearance externally, had completely destroyed the trunks of the olfactory nerves, compressed the optic nerves, and hollowed out for itself a cavity in the inferior surface of the brain. The layer of cerebral substance in contact with the

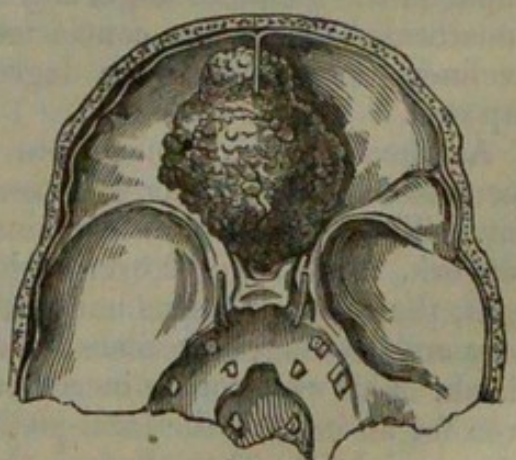

Fig. 108.

tumour, was in a soft state. *Figure* 109 is a vertical section of the diseased mass, and shows the radiated disposition of fibres which it presented, similar to what is observed in other cases of carcinoma. Some vascular ramifications, apparently veins, followed the direction of the fibres. This figure also shows that the tumour had sent down some prolongations into the nasal fossæ, where it had the same mammillated appearance and the same texture.[10]

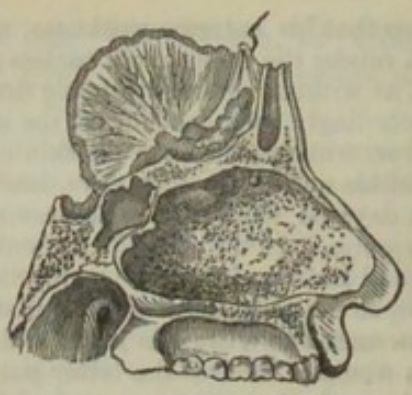

Fig. 109.

§ 7. *Amaurosis from cerebral congestion.*

It appears to be universally admitted, not only that amaurosis may occasionally result from a sanguineous overflow to the brain, or an impeded return of the blood from that organ, but that one of the most common causes of this disease is simple turgescence of the vessels supplying the internal optic apparatus.

Symptoms. The first symptoms with which congestive amaurosis generally shows itself, are a feeling of fulness in the eyeballs, and almost uninterrupted photopsia. These symptoms are speedily followed by stupifying headach, generally accompanied by vertigo, and tinnitus aurium, and keeping pace with a striking diminution in the power of vision. In some cases, the patient is deprived of sleep; in others, he is affected with lethargy. When the internal carotids are chiefly affected, lethargy is generally a prominent symptom; when the vertebrals, pain in the occiput.[11] The patient is commonly of an athletic habit, and presents signs of general plethora. In some instances, however, the reverse of this is the case; for example, in pregnant women, who sometimes have been known to suffer towards the end of several successive pregnancies from this amaurosis. The signs of local plethora are always present. The eye appears fuller than natural; it seems to project unusually from the orbit; the patient moves it less than in health; its surface is suffused with red vessels; the face is flushed, and the temporal, and sometimes even the carotid arteries are felt strongly throbbing. The pupil, in the incipient stage, may not be much affected, being neither unnaturally dilated nor contracted, and still varying with tolerable liveliness according to the degrees of light to which the eye is exposed.

As the disease advances into the confirmed stage, the headach becomes irregular, being sometimes severe, at other times scarcely felt. The patient now complains principally of a thick gauze or network, which renders every object before him indistinct. In clear light, the network seems uniformly obscure; but in the dark, it is fiery and shining, sometimes appearing reddish, and at other times bluish. This symptom is increased by every cause which increases, even for an instant, the local plethora. For instance, if the patient presses violently when at stool, the network seems thicker for some

minutes after; and if this cause or similar causes of increased local congestion be frequently repeated, and the existing plethora not removed by proper remedies, vision soon becomes totally extinguished. This indeed almost constantly follows, even when there are no such occasional augmentations of the plethora, if recourse is not had to proper treatment; but not so rapidly as when such occasional causes are allowed to come into frequent operation. At last, all trace of sensibility to light is lost. The patient continues to complain of stunning headach. He complains also of a feeling as if the eyeballs were increasing in size; and they actually feel firmer to the touch than natural. The pupil becomes fixed, though rarely much dilated. The patient stares on vacancy, presenting in a striking manner the peculiar look of the amaurotic.

Exciting Causes. Every influence capable of producing or increasing a continued or frequently repeated determination of blood to the head, may be regarded as an exciting cause of this amaurosis. Those who are of a plethoric habit are generally able to produce a slight degree of it at will. When they stoop forwards, hang down the head, tie their neckcloth tight, or by any means increase the circulation of blood through the brain, or, perhaps, to speak more correctly, when they impede in any way the return of that fluid towards the heart, they excite the sensation of muscæ volitantes, or even complete temporary blindness. Boerhaave relates the case of a man, who whenever he was intoxicated, laboured under complete amaurosis. The disease came on by degrees, increasing with the quantity of wine; and after the intoxication went off, his vision returned.[12] Many plethoric persons regularly find their vision impaired during the quickened circulation from a full meal and a few glasses of wine; while those of a meagre habit not unfrequently find their vision benefited by the same causes.

The following influences may be enumerated as likely to prove remote causes of congestive amaurosis; pregnancy, tedious and difficult parturition, raising and carrying heavy loads, long-continued occupations which strain the eyes while the head is bent forwards, employments requiring at once keen exercise of sight and activity of thought, rage and other violent passions of the mind, the sudden suppression of some wonted sanguineous discharge, suppressed menses, the neglect of periodic blood-letting to which the individual has been accustomed at a certain period of the year, violent and long-continued vomiting, a forced march in hot weather, very hot baths even of the feet only, remaining long in an over-crowded assembly, an excessive and unaccustomed debauch, frequent constipation of the bowels, violent pressing while at stool, lying with the head uncommonly low during the night, large scrofulous or other swellings in the neck by which the jugular veins are compressed, impeded reception of the venous blood by the heart from contraction of the right auriculo-ventricular opening. If two or more of these, or similar causes, operate together, and more especially if they come to operate suddenly on an individual, perhaps constitu-

tionally inclined to fulness about the head, then the risk of congestive amaurosis is much increased.

Proximate Cause. Plethora is described as an excessive fulness of vessels, as a redundancy of blood, as redness of a part from distended blood-vessels, as redness, heat, and tumour even, either of the whole or of a part of the body, from the same cause; and yet as something different from inflammation. The absence of acute pain appears one of the chief distinctions of plethora from inflammation; but added to this is the fact, that though plethora often ends in the rupture of the affected vessels, it frequently terminates without any such event, while inflammation, though it is sometimes resolved, is in general attended by the effusion of serum, or of coagulable lymph, the formation of pus, ulceration, gangrene, or even by several of these events in succession.

"Plethora and sanguineous determination to the head" says Dr Burrows,[13] "are often used synonymously in medical language; but they differ widely, inasmuch as determination may exist without plethora, and plethora without determination. Blood may be sent to the brain with a preternatural velocity, and act simply by augmented motion but be as readily returned by the veins: this is determination. It may be sent either with a natural velocity, or a degree greater or less than is natural; and from some obstructing cause be not returned by the veins in that due proportion in which it has been conveyed to the brain—accumulation, therefore, occurs: this is plethora."

The pathology of plethora of the brain, and of its frequent effect, apoplexy, is by no means satisfactorily understood; for while many observations would lead us to suppose that inflammation of the arterial tunics, and deposition of calcareous matter between their middle and innermost layers, are intimately connected with these diseases, if not actually their proximate causes, leading in apoplectic cases to rupture of vessels and extravasation of blood, the numerous instances, in which, after death from apoplexy, no diseased appearances whatever are detected within the cranium, show, that there not only remains room for farther investigation of this subject, but that no general conclusion can at present be adopted without danger of falling into some serious mistake.

Prognosis. So long as congestive amaurosis is in the incipient stage, and the power of vision not greatly impaired, the practitioner may venture to give a favourable prognosis. In the confirmed stage, or when the power of vision is nearly or completely extinguished, the prognosis is extremely unfavourable. Even when the disease is only of a few days' standing, if no power of vision be present, there can be but little hope of its recovery. When the patient has continued for several months in this state, it scarcely ever happens that even the slightest restoration of sight is effected.[14]

Treatment. Slight incipient attacks are often cured by rest, purgatives, and a spare diet. In more threatening cases, general blood-letting ought to be practised from one of the veins of the arm,

the jugular vein, or temporal artery. This may be followed up, if it seems necessary, by local blood-letting, as cupping on the back of the neck, cupping on the temples, or the application of leeches to the head. Purgatives are particularly useful. An entire abstinence from animal food must be observed, as well as from all alcoholic fluids. Cold applications are to be made to the head, which ought previously to be shaved. Complete rest of the eyes, and of the whole body, and a careful prevention of irritation from light, must be enjoined.

Depletion, then, and the antiphlogistic treatment, in all its parts, are the means upon which we are to depend, in the early period of this amaurosis. They will seldom fail us, if had recourse to within the first two or three days, and employed with the necessary vigour.

If the complaint has been neglected for some time, or treated without depletion, which we need scarcely distinguish from neglect, we should even yet have recourse to blood-letting. If depletion has been fully tried, but without benefit, the prospect is extremely bad. Excitation of the absorbent system ought now to be tried, especially by means of mercury and counter-irritation. The mouth should be made sore by a course of calomel, or blue pill; the head blistered; and an issue opened by caustic, on the nape of the neck.

Should this treatment also fail, there still remain many other remedies which might be employed; but the use of stimulants must be pursued with more than ordinary caution, as they might readily produce renewed congestion, or even induce apoplexy.

§ 8. *Amaurosis with apoplexy, from encephalic hæmorrhagy, &c.*

When cerebral plethora is neglected, it is exceedingly apt to end in that sudden abolition of the powers of sense and motion, to which we give the name of *apoplexy*. Among the usual symptoms of this state, we find loss of vision, and, most frequently, dilated pupils.

In a pathological point of view, apoplexy resolves itself into three varieties, viz. apoplexy with extravasation of blood, apoplexy with serous effusion, and apoplexy without any evident morbid appearance on dissection. The last mentioned, Dr Abercrombie calls *simple apoplexy*. Where a person is attacked by apoplexy, and no morbid appearances are found on dissection of the brain, the cause is to be sought for in an interruption of the relation betwixt the arterial and venous system of the organ. Amaurosis may result from any of the three, and may be one of the earliest, or one of the latest, symptoms to disappear.

It is not improbable that in many cases not suspected to be apoplectic, amaurosis is the result of the rupture of several small vessels, throwing out blood separately, and this either coalescing into one clot, or forming many small lodgments, on or in the brain; in the latter case, attended with lacerations of its substance. Slight apoplectic attacks may not attract the patient's attention, till he finds his vision seriously impaired. This is apt to be followed by palsy and loss of memory.

In a case of apoplexy related[15] by Mr Williams, coagulated blood was found to have penetrated the very substance of one of the optic nerves.

The treatment of apoplectic amaurosis does not differ in any essential particular from the plan above recommended, for the same disease, arising from cerebral congestion.

Case 291.—Mr Stevenson was called to attend a patient between 40 and 50 years of age, who was found lying on the ground in an apoplectic fit. This person was tall and thin, his countenance pallid, and his habits remarkably temperate and regular; consequently it could not have been thought likely that he should fall a sacrifice to apoplexy. Notwithstanding the various and active means that were employed for his recovery, he expired within 12 hours after the attack.

In the forenoon of the following day, Mr Stevenson examined the contents of the cranium, and found not only the most decisive marks of vascular congestion in the meninges, but likewise a large accumulation of discoloured serous fluid in the ventricles of the brain, and a mass of coagulated blood so situated as to compress the optic nerves at the part where they decussate. This latter discovery explained the cause of his total blindness, and of the fully expanded state of his pupils; although when Mr Stevenson first saw him, he was not entirely destitute of the power of sensation and feeling.[16]

Case 292.—Ann Nowlan, aged 43, married, was admitted into Sir Patrick Dunn's hospital in Dublin, said to be labouring for some days under fever, for which she had got from a physician cordial diaphoretic medicines. When she became Dr Law's patient, she presented the following symptoms:—Distressing supraorbital headach; pulse 100, weak; tongue loaded with a dark-brown crust at base and in the centre, red and glazed at point and edges; stomach irritable and painful on pressure; skin of natural temperature; no petechiæ; great depression of spirits. Twelve leeches were applied to the epigastrium. An effervescing draught, with tincture of opium, was given. A cold lotion was applied to the forehead.

These means did not relieve the headach, nor the sickness and irritability of stomach. On closely examining the symptoms, Dr Law was led to regard the headach as the first and principal link in the morbid chain, and the other complaints as its effects. The patient admitted having been long subject to headach. She had a strength of voice and power of moving herself, apparently incompatible with the other symptoms, as characteristic of fever. Acting upon this view, leeches were applied to the left temple, to which she principally referred the pain. She derived temporary relief from their application. Blisters were next tried, and they also relieved for a time. Dr Law now determined to bring the system under the influence of mercury, and ordered for this purpose a combination of calomel and James's powder. No sooner had the mouth become sore, than the headach entirely ceased, and the loaded tongue became clean. The complete exemption from pain lasted only so long as the mouth continued sore, for no sooner had the mercurial influence subsided, than the pain returned, although much less constant and less intense. When the pain returned, the tongue resumed the loaded appearance. The mercury was again resorted to, and removed the pain, never to return.

The patient, now, for the first time, directed Dr Law's attention to a failure of the sight of her left eye, of which she said she had the perfect use when she came into the hospital. The pupil was found to be permanently dilated. Dr Law applied repeated blisters, and sprinkled some with strychnia, but the eye became quite amaurotic.

The patient had now enjoyed a long exemption from headach, and seemed to labour only under great depression of spirits, when she was suddenly seized with a fit. She was found in a state of complete insensibility; the respiration extremely laboured, but without stertor; the pulse weak and slow; face not flushed; no throbbing of the carotids. The temporal artery was opened, and about ten ounces of blood were drawn in a full stream, when the pulse began to fail. A compress and bandage were applied, but the bleeding was with difficulty restrained.

The face now flushed, the carotids began to pulsate strongly, and while a turpentine enema was about to be administered, the patient expired, about two hours from the time of the seizure.

Inspection. A considerable quantity of black fluid blood issued, on dividing the scalp. The superficial vessels of the brain were very full and congested. When the brain was removed from its situation, not less than six ounces of fluid blood were found effused at its base. A large coagulum occupied the place of the locus perforatus, or floor of the third ventricle, which seemed to have been completely destroyed. Both crura cerebri were elongated and displaced, and their consistence was diminished by the violence they had sustained. The lateral ventricles were distended with two clots of blood, which lay in contact with one another in consequence of the destruction of the septum lucidum. The right thalamus was natural; the centre of the left was softened and broken down, and contained a clot. The basilar artery was healthy, but the middle arteries of the brain presented many ossified points. There was no appearance of disease in the optic nerves.[17]

Case 293.—In the beginning of 1809, Mr John Cunningham Saunders announced his intention of publishing a treatise on some practical points relating to the diseases of the eye, but he was not enabled even to correct what he had written. The attacks of the disease which proved fatal to him became so frequent, the pain of his head was so excruciating, and in his intervals of ease he was so much deprived of that energy of mind which had been natural to him, that he was unable to redeem his pledge. His disease commenced with the following symptoms:—Acute pain of the scalp, investing portions of the occipital and right parietal bones, accompanied with an unreal sensation of icy coldness in the affected part, urgent vomiting, pulse sometimes frequent, and at others undisturbed. These paroxysms generally passed away in the space of 24 hours, and returned at uncertain intervals. They were excited by a current of cold air chilling the skin, by indigestion, and by anxiety. He was habitually temperate; he disliked wine, and took even malt liquors with caution, for they aggravated his disease.

He was subsequently affected with an incomplete amaurosis of the right eye. The pupil was of its proper size and figure, and contracted and dilated in proportion to the quantity of light which fell on the retina. Luminous bodies, to use his own expression, were shorn of their beams; objects, besides being obscured, appeared diminished in size, and deranged in position; the accurate distinction of colours was lost, apparently because the action excited by the predominant colour dwelt on the retina.

Blood was freely drawn from his neck by cupping, he was confined to a dark room, under a very low regimen, and his bowels were kept open; yet during this period he suffered two severe paroxysms of his disease in quicker succession than usual. They were accompanied with frequency of pulse, and terminated by sweat. His pulse was naturally frequent and very full, like the pulse of a patient under pleuritis. His radial arteries were unusually large.

At the approach of the winter of 1809, the paroxysms of headach and vomiting became more frequent. He had sensibly wasted, and was often distressed with dyspepsia and palpitation. In giving his last anatomical demonstration, in November 1809, he felt oppressed by the heat of the room and the numerous class which surrounded him, and was obliged to retire, leaving his demonstration unfinished. His attention was first interrupted by a numbness of his right leg, his expressions were confused, he continued to repeat the words he had last uttered, and although he was conscious of his error, he could not correct it. The voluntary muscles were affected, and he walked with an unsteady pace. From this period he frequently lisped, and had a difficulty in retaining his saliva.

On the 4th of January 1810, he experienced a similar attack, which affected chiefly the voluntary muscles. He was unable to walk without support. His countenance was pallid and disfigured, and bore, instead of its wonted expression, the character of fatuity. His extremities were chilled. He suffered other attacks of his disease, similar in kind, but varying in their degree, in one of which he fell in the street. He attributed this unsteadiness in moving to a defective sensation, for he did not always distinctly feel the ground. He continued his professional

pursuits, and, in the intervals between the attacks, he was capable of walking a considerable distance.

The functions of the alimentary canal became more disordered. Various mild fluids taken for breakfast, were rejected by vomiting. Nothing was so grateful to his palate as water. His appetite for dinner was irregular, and his stomach would receive only the most simple diet. His bowels were torpid. His heart palpitated more frequently than usual. His skin was pale; the capillary arteries, far from loaded, had not matter enough for nutrition. He continued to waste. His mind became unequal, and his spirits low.

As soon as the amaurosis of the right eye manifested itself, the evacuant plan was pursued, and stimulants refrained from. At no subsequent period did his declining strength admit of further reduction.

On the 9th of February 1810, Dr Farre was called to Mr Saunders at three in the afternoon, and found him usually low. He had just dined, and had been induced from a feeling of languor, to take three glasses of wine, which in him was an excess. Between five and six o'clock, he visited a patient. At nine, Dr Farre saw him again. He conversed for nearly an hour, chiefly on his own case, and especially respecting the palpitation, which so often distressed him, and which he thought proceeded from organic disease of the heart. His pulse was then 74 and regular. In a few minutes after this examination, he complained of a numbness of the little toe of the right foot, and remarked that he had of late occasionally felt a pressure about the calf of that leg, even when undressed, as if it were girt with a tight pantaloon. In an instant afterwards he grasped the scalp over the right side of the occiput, the old seat of pain; his face was pale, covered with sweat, and convulsed on the right side; he drew up his right leg, and dropped to the right side. He looked at Dr Farre, and said with a failing articulation, "paralytic fit." His pulse was now 140. He several times pronounced the name of his wife with an affecting emphasis, and became insensible. A deep apoplectic stertor seized him, and his pulse fell to 40. After 10 ounces of blood were taken from his arm, which produced no obvious advantage, the temporal artery was opened, and 16 ounces more were rapidly drawn off. The stertor ceased, and the pulse rose and became free; but these were the only effects. He remained without sense or motion, and his pupils were dilated in the utmost degree. More blood was suffered to flow from the temporal artery, but it had now almost lost its arterial character, and resembled venous blood. He expired in the space of two hours and a half after the apoplectic attack.

It is remarkable that the retina of the right eye, for some time previous to his death, had recovered its sensibility in a degree sufficient even for his professional pursuits.

Inspection. The dura mater adhered firmly to the inner side of the cranium, especially over the right eye; but it was apparently free from disease. The tunica arachnoidea and pia mater were healthy. Although other parts of the body had become changed by putrefaction, the brain, now three days after death, possessed an uncommon degree of firmness. On cutting open the lateral ventricles, a quantity of coagulated blood was found at the posterior part of each, and nearly an ounce of bloody serum was discharged. The clot of blood extended from the right ventricle in the direction of its inferior cornu, and that part of the brain, which was in contact with it, had a soft and broken texture. The weight of the clot was at least an ounce. In the pons Varolii, there was extravasated blood, disposed in streaks.

The heart was large, and its texture so soft that it broke down very readily under the pressure of the fingers. This was more especially observable on the left side. The valves on both sides of the heart and arteries were sound.[18]

Case 294.—The late Earl of Liverpool, in consequence of exposure to cold, suffered from crural phlebitis, attended by remarkable slowness of the pulse, which was 44 in a minute. The sight of his left eye became affected, and soon after he had a series of attacks of apoplexy, which proved fatal.

The left iliac vein was found completely impervious, and a large cavity filled with serum occupied the brain over the right ventricle.[19]

Case 295.—Dr Abercrombie mentions[20] the case of a gentleman, who, after an apoplectic attack, lost his sight, and continued in a state of perfect blindness for

about seven years. After that time, while one day out in his carriage, he suddenly recovered sight; and it was found that he had entirely retained his skill in drawing, for which he had been distinguished before the attack.

In this case, a clot may have pressed on the optic nerves, but becoming shrunk, had at length shifted its situation, and allowed the nerves to be freed of pressure.

§ 9. *Amaurosis from aneurism of the encephalic arteries.*

Mr Ware was of opinion, that amaurosis might not unfrequently be owing to dilatation of the circulus arteriosus. "Should then the dilatation" says he, "take place in the posterior portion of the circulus arteriosus, so as to compress the nervi motores oculorum, the consequence will be, that the eyelids, and probably the eyes also, will lose the power of motion. But if the dilatation happens in the anterior portion of the circulus, as the compression will then be on the optic nerves, the sight must, of course, be destroyed. And should the dilatation take place in both portions, so as to occasion a compression both on the optic nerves and the nervi motores oculorum at the same time, while the eyelids will hereby be rendered immovable, the eyes also will be deprived of sight and motion together."[21]

Whether this is actually a frequent cause of amaurosis, it is impossible to say. Indeed, the want of accurate dissections is one great cause of the obscurity which hangs over the subject of amaurotic diseases. That aneurism of the cerebral arteries is occasionally a cause of amaurosis, is established by the following case, related by Mr Spurgin.

Case 296.—A labourer, aged 57, became suddenly insensible, whilst at work, about the beginning of March, but quickly recovered without assistance, and resumed his employment. Three weeks after, he had another fit, and remained in a state of stupor three or four days. He complained of constant pain at the top of the head, much increased by stooping, and which frequently deprived him of sleep. His countenance appeared dejected, heavy, and sallow. He was extremely morose and sullen, often refusing to return any answer to questions, and frequently finding fault with his attendants. The pupils were much dilated, but both contracted slowly upon the approach of a strong light. The right eye was affected with cataract, but he could distinguish light from darkness with this eye. His pulse was generally about 90, and weak. He was purged freely, and a blister was applied to the nape of the neck. These remedies somewhat relieved him; but, after a few days, the pain became as constant and distressing as ever. He had now eight ounces of blood taken from the neck by cupping, which greatly mitigated the pain. Four days after this, while sitting at dinner, he again became comatose and insensible; his respiration hard and stertorous, his pulse full and slow. The pupil of the right eye was dilated; the left constricted; both immovable. He was now bled freely from the arm, and blistered; but became rapidly worse, and died next morning.

On dissection, it was found that the dura mater adhered more strongly to the cranium than usual, and its surface presented a blackish blue appearance from the veins beneath. Adhesions had formed between this membrane and the arachnoid, and between the latter and the pia mater. The veins of the pia mater were much enlarged, and distended with blood. Three or four fungous patches had risen from the surface of the cerebrum, through the membranes, and adhered to the bone. Upon raising the falx, it was found to have united to both hemispheres, and these, below the falx, to each other. A considerable quantity of deeply-tinged bloody fluid escaped from the left ventricle as soon as penetrated, and a

small coagulum was found entangled in the plexus choroides. In removing the upper surface of the right hemisphere, the right lateral ventricle was cut into, being raised above its ordinary level, and a quantity of coagulated blood was discovered, amounting to three or four ounces. The right corpus striatum had become enlarged to more than twice its natural size. The surface of this body, and the sides of the ventricle, were abraded and pulpy, leaving a pinkish green appearance. Removing the brain from the cranium, a long red streak was seen upon the under surface of the right anterior lobe, and under this an abscess was discovered, of rather more than an inch in length. Immediately behind this, to the other side of the olfactory nerve, and before the junction of the optic nerves, an aneurism, of the size of a hazel nut, of the right anterior cerebral artery, was found pressing upon the right optic nerve. The coats of the aneurism were very thick, and its cavity contained a small coagulum. It had burst on its upper surface into the lateral ventricle.

The sheath of the right optic nerve, particularly at the entrance of the nerve into the eye, was found thickened and distended with blood, and adhered firmly to the proper substance of the nerve. The veins were much enlarged on the back of the sclerotic. The choroid had its usual appearance; but the retina presented a pinkish-gray colour, and the ramifications of the central vein could be readily seen over its whole surface, as far as the lens. The posterior capsule of the lens was opaque; the lens semi-opaque, and wasted to one-half its natural size.[22]

§ 10. *Amaurosis from enlargement of the pituitary gland.*

Lying beneath and behind the chiasma of the optic nerves, the pituitary gland, in a state of morbid enlargement, necessarily comes to press upon the nerves, and has sometimes been found to have produced almost their complete absorption. Numerous cases of amaurosis from enlarged pituitary gland are on record. In some of them, the affection of sight was one of the earliest symptoms; while, in others, it did not occur till a variety of other signs of encephalic disease had manifested themselves. Along with the amaurosis, which generally affects both eyes, the patient complains of pain or weight in the forehead, apathy, loss of memory, emaciation, and general weakness. Neither convulsions, nor hemiplegia, seems liable to occur from enlargement of the pituitary gland, but the parts in contact with the diseased mass are excited by its presence to inflammation, so that at last the symptoms present a combination of those of encephalitis with those of pressure on the brain.

Case 297.—John Austin, a baker, a strong muscular man, of temperate habits, aged 38, had for three years been afflicted with dimness of sight, accompanied at intervals with severe pain in the fore part of the head, and a sense of burning, and fulness of the orbits. He received no benefit from leeches, blisters, and other remedies; on the contrary, the application of leeches appeared rather to increase than diminish his sufferings. His strength and general health continued very good, he was up during the greater part of the night, and frequently carried very heavy loads during the day. The digestive organs had been, for the most part, regular in their functions, excepting at slight intervals, and then only from such causes as might be considered wholly independent of any existing local affection.

On Sunday, 25th May 1823, he complained that during the preceding five or six weeks, the dimness of vision had considerably increased; that the pains had been much more severe, and that he had felt a strong inclination to sleep, so much so that if, during the day, he sat down for a few minutes to refresh himself, he fell asleep, being unable to prevent it, and would continue so until disturbed. For two or three days, he had been completely blind in the right eye, and that morning found himself, for the first time, totally blind in both. For a week or ten days he had been able to distinguish objects, but upon going to bed the previous

evening, the only object he could discern was the candle, and that not distinctly. On examining the eyes, no very apparent disease manifested itself, the pupils did not contract on the application of a strong light, they appeared rather small, but perfectly clear. The patient complained of some loss of appetite. Pulse 96, and small. On the supposition that some of the more prominent symptoms depended on a disordered state of the stomach, he was ordered an emetic, and after its operation 5 grains of calomel, to be followed next morning by an opening draught.

Next day, it was found that the medicines had operated well. His headach was not so considerable, and in a small degree he had recovered sight in the left eye; he could see the windows, and on placing the hand before his eye, he could distinguish something, although unable to tell what it was. The medicines were ordered to be repeated.

On the 27th, he complained of being much weaker, and consequently kept his bed, which he had not done previously. His headach was better; his vision as on the 26th; he slept constantly, and snored very loudly. Six leeches were ordered to the temples, the calomel and opening medicine were continued, and a blister was applied to the nape of the neck.

On the 28th, an eminent oculist being called in, he considered the illness to arise from congestion in the cerebral vessels, and ordered 20 ounces of blood to be taken from the arm, with a saline draught every four hours. The patient fainted when he was bled.

On the 29th, he was more inclined to sleep; was roused with much difficulty, but when awake, spoke very sensibly, and answered the various questions proposed to him. Since the bleeding, the pulse had been 120, and weaker; and the patient's debility greater. A physician who was called in, ordered him to lose 24 ounces of blood from the arm, the saline medicine to be continued, 4 grains of calomel to be taken at bedtime, and an opening draught on the following morning. Next day, at half-past twelve, the patient died.

On dissection, the membranes of the brain were found quite healthy; some degree of fulness of the vessels existed, but it was only trifling, the fluid in the ventricles was about the natural quantity; on raising the anterior lobes of the brain, a tumour was found arising from the situation of the pituitary gland, and pressing upon the optic nerves; it was of considerable size, forming a nidus in the anterior lobes; the optic nerves were expanded upon it, the right more than the left; the olfactory nerves were likewise very much pressed upon.[23]

Case 298.—A person of the name of Bardon, aged 36, was admitted into the *Hôtel-Dieu* at Paris, on the 8th September 1827. His pupils were greatly dilated, the right being still slightly moveable, the left not at all. The left eye, was, in fact, completely lost; the right just served for discerning large objects, without enabling the patient to distinguish their size, form, or colour. For eight years he had been subject to violent pains in the head, and a year and a half before his admission into the *Hôtel-Dieu* had been obliged to give up his occupation, which required him to be frequently employed in writing. His countenance was pale, and constitution lymphatic. He was bled, and had a seton inserted in the neck, without much benefit. Blisters were next applied to the forehead and temples, followed by sensible amendment, so that in three weeks he could distinctly perceive persons passing at a considerable distance. The same means were continued, and the patient remained in the same state till the 13th of November. Upon that day, he complained of headach, and severe pains in the eyes and ears. On the 15th, fifteen leeches were applied behind the ears; the headach subsided, but the other pains continued. On the 21st, two or three minutes after speaking to one of his medical attendants, he suddenly expired.

In the interval between the junction of the optic nerves and the pons Varolii, and between the vessels forming the circle of Willis, there was a cyst, the size of a small hen's-egg, partly fibrous, partly osseous, filled with a yellowish substance, mixed with blood, about a third of this substance being solid and somewhat resembling a tubercle, the rest fluid and oleaginous. This cyst had flattened and almost destroyed the optic nerves. Indeed, what remained of these nerves adhered along its inner side to the cyst, by some altered cerebral substance, and anteriorly lost itself upon the osseous part corresponding to the commissure of

the nerves. Farther forwards, the nerves were found in a wasted state passing into the orbits; but between this, their anterior portion, and the posterior, there was no other continuity than what was formed by the cyst. There was no trace of the pituitary gland, its situation being entirely occupied by the cyst. The retina within the eye was thin, reddish, and almost transparent.[24]

This case is published by Magendie, with the following query prefixed to it, *Can vision be preserved notwithstanding the destruction of the optic nerves?* It is probable, that the patient had either deceived himself, regarding the degree of vision which he recovered after the application of the blisters; or, that if he was actually able to perceive persons passing, as is stated in the case, eight days before his death, the progress of the disease during that period had been exceedingly rapid.

§ 11. *Amaurosis from concussion, or other injury of the head.*

It not unfrequently happens, in cases of concussion of the brain, or other injury of the head, sufficient to stun the patient, that for a time he remains completely insensible to external impressions. The recovery, which, in general, speedily takes place, is sometimes complete; while, in other cases, the state of total insensibility is followed by one in which the sensibility is impaired, but not destroyed. The patient is not affected by ordinary impressions, but can be roused to perception. The pupils, in this stage, contract on exposure to light, and are sometimes more contracted than under ordinary circumstances. These symptoms may wholly subside in the course of a few hours, or they may continue for three or four days. In the latter case, it frequently occurs, that the patient regains his sensibility for a time, and then relapses into his former condition. Where inflammation of the brain follows concussion, it sometimes happens that there is no interval of returning sense, the symptoms of concussion being gradually converted into those of inflammation. But it is also often the case, that there is a considerable interval of that sort, or even a period of apparent health, before the symptoms of inflammation show themselves. Years may elapse before the patient becomes affected with any serious indications of cerebral disease.

The inflammation which succeeds to concussion, and other injuries of the head, may be more or less extensive, and more or less acute; affecting the whole contents of the cranium, and rapidly proving fatal, or limited to some particular part of the brain, and inducing death only after a series of the most distressing symptoms, as violent headach, amaurosis, palsy, convulsions, and the like. These symptoms occur sometimes in one order, and sometimes in another. Our knowledge of diseases of the brain is not yet sufficiently exact, to enable us to refer the symptoms which occur, to the particular seats or terminations of the inflammatory action.

The appearances on dissection consist in lacerations of the summits of the cerebral convolutions, increased vascularity, extravasations of blood, serous effusions, indurations, softening or ramollissement, diffuse or encysted abscess, &c.

Case 299.—A young gentleman, at 12 years of age, received a rap at school with the edge of a flat ruler, because he was dull at his learning. The blow was on the right side of the head, and a small wound was the consequence, which, for the space of six years, nothing would heal. It then healed, and he very soon afterwards perceived that his sight was beginning to fail. In this respect he continued to decline, till, at length, he became quite blind. Added to this, he now began to suffer from epileptic fits, which most frequently returned upon him every day.

The only thing considered likely to afford any prospect of real advantage, was the removal of a portion of bone by the trephine. There was no particular appearance in the cicatrice of the old wound, where the blow had been received; nor, on exposing the bone, was it found diseased, or even discoloured. On removing the piece separated by the crown of the trephine, some blood and serous fluid escaped from between the skull and dura mater. This membrane, however, did not appear to have lost its healthy colour. By the next day, the pupil of each eye had recovered its natural sensibility, dilating and contracting, according to the degree of light. The blindness remained absolute, as before the operation. The patient's strength hourly declined; a degree of low fever supervened; and on the third day after the application of the trephine, he was seized with an unusually severe fit, soon after which he expired.

On opening the head, the cranium was to appearance everywhere healthy, and so was the dura mater. Below the part where the dura mater had been exposed by the trephine, and consequently opposite the seat of the original wound, the pia mater had evidently suffered from chronic inflammation, but this appearance was circumscribed. On cutting into the brain, it was found indurated to a considerable degree, and this induration had extended itself to the whole of the middle lobe of the cerebrum, commencing upon the surface of the hemisphere, and passing through the brain down to the basis of the cranium.[25]

Case 300.—A young lady, when about 15 years of age, received at play a slight tap, rather than a blow, on the right side of her head. It gave her at the moment rather severe pain; but she disregarded it, and no immediate consequences of any kind followed, more than a common headach, commencing always in the part which had been struck. For above 30 years she continued subject to these attacks, and then, though naturally very lively, began to grow heavy, and sometimes stupid and sleepy, without any known additional cause. This disposition continued gradually to increase, till, for the last year and a half of her life, it was very difficult to keep her awake; but when she was awake, though it was but for half an hour, she displayed all her natural brilliancy of conversation. Then, all at once, she would drop asleep again, not to be roused. In this way she went on till a perpetual comatose state took place, and she died convulsed. Her vision had become very much, although very gradually, impaired.

On dissection, as soon as the scalp was removed from over the right parietal bone, a portion of the bone, about the size of a crown piece, directly under the part where the blow had been received, and to which she had invariably pointed as the seat of her pain, was observed to be of a very dark colour. On removing the right parietal bone, the part of it which appeared discoloured, was found to be transparent, and almost wholly absorbed. It derived the dark colour, which it at first presented, from the portion of the right hemisphere of the brain, directly under it, being perfectly black; the dura mater at this part being altogether removed by absorption, the colour appeared through the bone. Had she lived much longer, the bone also would have been quite absorbed, and the brain itself would, in all probability, have protruded. The portion of brain under the seat of the injury was indurated and scirrhous, and this change had taken place through the whole of the middle lobe of the cerebrum. The colour was dark livid. Every other part of the brain was perfectly sound, nor was there any disease in the thorax or abdomen. The disease above described, had so pressed on the optic nerves at their origin, as to make them as flat as a piece of tape, thereby occasioning the loss of sight, which, for some time before death, had amounted to almost total darkness.[26]

§ 12. *Amaurosis from congestion or inflammation of the nervous optic apparatus, brought on by exposure of the eyes to intense light, or by over-exercise of the sight.*

This is one of the most frequent varieties of amaurosis, resulting sometimes from a single, short, or even momentary, exposure to very vivid light; in other cases, from long-continued, or frequently-repeated, examination of luminous objects, or from intense exercise of the sight upon things moderately or imperfectly illuminated. Persons, for example, have been struck blind from viewing an eclipse of the sun. Long-continued exposure of the eyes to the light reflected from a country covered with snow, the frequent use of telescopes or microscopes, reading or writing for many hours together, especially by candle-light; these, and such like are the fruitful causes of this variety of amaurosis, and are more apt to produce their injurious effects on the organs of vision, if the eyes are naturally weak, or the individual inclined to cerebral congestion. Literary men, engravers, and others, whose occupation is at once sedentary, and requires constant exercise of the sight, are frequently affected with this amaurosis. The repose of Sunday has a remarkable influence on the subjects of this disease; tailors, and others, observing, that at no period of the week, do they see so well as on Monday morning.

The symptoms are variable, but chiefly subjective. The congestion or inflammation, upon which they depend, affects the retina, the optic nerves, and the cerebral portion of the optic apparatus. Neglected, it ends in atrophy of these parts.

The treatment consists principally in rest, depletion, mercury, and counter-irritation.

Case 301.—A soldier, unacquainted with the proper method of observing an eclipse of the sun, employed for that purpose a piece of opaque glass, with a transparent point in its centre. Notwithstanding the vivid and painful impression he experienced from the solar rays which passed through the lucid part of the glass, he continued to look at the sun, till the end of the eclipse. He was soon afterwards seized with vertigo, and pain on the right side of his head, corresponding to the eye which he had employed, and found himself almost entirely deprived of the sight of that eye. Some weeks afterwards, finding that the acute pain of his head still continued, he came under the care of Baron Larrey, who observed that the vessels of the eye were injected with blood, the pupil a little less than that of the opposite eye, preserving, however, its natural movements, vision very obscure, or almost lost. After two blood-lettings, one from the temporal artery, and the other from the jugular vein, Larrey ordered blisters to the temple, and to the nape of the neck. Ice was then applied to the head, followed by moxas, which completely re-established the patient's sight; but he still retained a feeling of dull pain over all the right side of the head.[27]

Case 302.—A West Indian, of middle age, a free liver, and accustomed to an indolent life, after having been for four hours on horse-back, exposed to a burning sun, began almost immediately to notice a dimness of sight in his right eye, which rapidly increased, so that at the end of a fortnight his sight was entirely lost. There was never any pain or inflammation in the part. Eighteen months after the commencement of the malady, the eye, though perfectly blind, presented no appearance of disease, except that the pupil contracted imperfectly on exposure to light.[28]

Case 303.—A captain in the navy had made much use of his right eye, for many years, in observations with telescopes and sextants. About a week before he applied to Mr Travers, he observed a mist before this eye, which increased until it was so dense, that he could neither distinguish the features of his friends, nor the large letters of a title page. The eye was free from inflammation, the pupil large and sluggish; he had no pain either in the eye or the head. He was bled copiously from the arm and temple, and briskly purged with calomel and jalap, at short intervals. Blisters were applied to the temples. He then rubbed in a drachm of the strong mercurial ointment for several nights in succession; this produced a copious flow of saliva and violent diarrhœa, so that no benefit was obtained. By a calomel and opium pill taken night and morning, his gums were immediately made sore. In three days, the mist began to clear, and he was delighted to find that he could tell the hour by his watch. He continued improving so rapidly, that at the expiration of ten days, he could read an ordinary print with perfect facility, and the pupil had recovered its ordinary magnitude and activity.[29]

Case 304.—The same author has recorded the case of a young gentleman, who having for twelve months habituated himself to intense study, reading and writing to a very late hour, found himself affected with a growing imperfection in the vision of his left eye, which advanced, unaccompanied by inflammation, pain, or any external symptom of disease. It seemed at first a film before the sight, but at length amounted to total blindness. The pupil became greatly dilated, and had little or no action. A blister was applied to the forehead, which drew well, and was kept open for ten days, the eye being also excluded from light during that period. He took, at the same time a calomel and opium pill thrice a-day. In the space of a few days, his mouth became sore; the pupil acted, though unequally, and he experienced a gradual recovery of vision. In the course of six weeks, he was enabled to resume his studies, and could perceive no defect in his sight. He had gradually reduced the dose of calomel, and now discontinued it for the decoction of sarsaparilla. Four months afterwards, the pupil was regular and active, and the sight unimpaired.[30]

Case 305.—Mr Allan mentions the case of a master of a printing-office, who became blind. He had corrected the press, and was otherwise engaged in reading, for 18 hours out of the 24, a practice which he continued for 12 months, notwithstanding an evident failure of his sight. At the end of this time, the amaurosis was so complete, that he could not distinguish one object from another, but was merely capable of perceiving the light, so as to find his way in the streets. He continued in this state for several years, but ultimately recovered sight. The treatment is not mentioned.[31]

§ 13. *Amaurosis from congestion or inflammation of the nervous optic apparatus excited by the presence of worms in the intestines.*

Among the symptoms generally enumerated as indicative of the presence of worms in the bowels, are dilatation of the pupil, want of lustre in the eye, blueness round the lower eyelid, epiphora, paleness of the countenance, headach, throbbing in the ears, and disturbed sleep; while, in certain cases, we are told that amaurosis, deafness, and apoplectic or epileptic fits, arise from the same cause. The presence, however, even of the majority of these signs cannot be regarded as conclusive evidence of the existence of worms; nor any signs, except the actual detection of the worms in the alvine excretions, or in the matter vomited by the patient. It must also always admit of doubt, whether the amaurotic symptoms present in those who are troubled with worms, do not spring from some other cause, as hydrocephalus or some morbid formation within the cranium. One of my medical friends informs me, that he some time

ago treated a child, who was amaurotic, and who at the same time passed numerous lumbrici, to which he was led to attribute the affection of the eyes. The amaurosis, however, did not yield to anthelmintic remedies; the child died, and on dissection the pituitary gland was found dilated into a tumour, which pressed upon the optic nerves, and had caused the absorption of their medullary substance.

I have never seen an instance of amaurosis caused by worms, nor have I met in the course of my reading with the original narrative of any such case. Bremser[32] merely quotes from Hannæus, that a little girl of four years of age, who had lost the powers of seeing and of speaking, was cured by the use of vermifuges; and from Remer, that two persons, affected with amaurosis, were cured by the evacuation of ascarides. Rognetta[33] quotes from Weller, the case of a little girl, aged six, who had been for three years completely amaurotic. Every other means having failed, anthelmintic powders were given, in consequence of which the child passed thirteen lumbrici in six days. By the continued use of purgatives, vision was in a great measure restored.

§ 14. *Amaurosis from congestion or inflammation of the nervous optic apparatus, consequent to suppression of the menses.*

When amaurosis occurs as a disease of conversion, or as a consequence of the suppression of any wonted evacuation, it is often difficult to say, whether the disease of the brain, to which the affection of the optic apparatus is to be attributed, is congestive, inflammatory, or hydrocephalic. In a practical point of view, this difficulty is not very important, as the relief of the brain, by bloodletting and purging, and the recall of the suppressed evacuation, or original disease, would still remain the chief indications, whatever was the nature of the cerebral affection.

Case 306.—The following case is related by Mr Brown of Musselburgh. The patient was a female about 40 years of age. Upon walking a considerable distance, in very warm weather, the catamenia appeared, nearly upon the termination of her walk. Being very much heated, she drank a full draught of cold skim-milk, which almost instantly brought on oppression about the præcordia, headach, and a total cessation of the menstrual discharge. In a few hours more, the headach became excruciating, and symptoms of hemiplegia presented themselves, with an attack of amaurosis in the left eye.

By means of copious local and general bleeding, blisters, and purging, considerable relief was obtained; but the affection of the eye remained the same. When the period of menstruation returned, no discharge occurred. Being of opinion that no complete cure could be effected, unless the recurrence of the catamenia could be obtained, Mr Brown directed his attention chiefly to this object. At the end of six months, they re-appeared, which was followed soon after by the complete restoration of sight.[34]

Case 307.—A lady, aged 30, about the 5th June 1824, was exposed to cold and fatigue during the flow of the menses, which ceased prematurely. After this, she was for some days observed to be remarkably languid, dull, and depressed. The pulse was natural; she complained of slight headach; but her appearance had excited an apprehension rather of aberration of mind than of any bodily complaint; and in this manner the affection went on for nine or ten days. Dr Abercrombie saw her on the 15th; she was then odd in her manner, abrupt and absent, but quite sensible when spoken to; she complained of slight headach; pulse a

little frequent. On the 16th, she was much oppressed; and on the 17th, in a state of nearly perfect coma, which continued on the 18th. On the 19th, after free purging with croton oil, she came out of the coma entirely, was quite sensible to every thing, and no alarming symptom remained, except that she sometimes saw objects remarkably distorted, and sometimes double. At other times, her vision was quite natural; the pulse was frequent, and the tongue loaded. In this state she continued for several days; she then complained again of headach; there was occasional incoherence; the sight was more indistinct, with dilated pupil; and the pulse increased in frequency. The pulse continued to rise, with much incoherent talking, and sinking of strength; and she died on the 20th, without coma.

The ventricles were distended with fluid, and there was extensive ramollissement of the septum and fornix. There was no other morbid appearance.[35]

§ 15. *Amaurosis from congestion or inflammation of the nervous optic apparatus, consequent to suppressed purulent discharge.*

Case 308.—A waggoner, aged 45 years, undertook a journey in wet and cold weather. The discharge from ulcers of his legs, which had for many years continued open, was suppressed, and he became blind. Fourteen days after, he was brought to the hospital. He saw nothing, not even a brightly lighted window. The pupil was oblong and extremely dilated. Beer immediately pronounced the most favourable prognosis, especially as there were present internal sensations of light in the eye, without varicosity, and without change in the humours. He had cured more than 20 such amaurotic patients, by restoring the purulent discharge. The prescriptions were sinapisms, of the size of the hand, to the ulcers of both legs, pediluvia with mustard, and internally three of the following powders daily—℞ *Sulphuris aurati antimonii gr. i. Camphoræ gr. ii. Florum sulphuris gr. vi. Sacchari gr. x. Misce.* The sinapisms were renewed daily, and on the 10th day vision began to return. The sinapisms acted severely on the ulcers, which became deep cavities, with dark-coloured edges. In 30 days, vision was almost completely restored.[36]

§ 16. *Amaurosis from congestion or inflammation of the nervous optic apparatus, consequent to suppressed perspiration.*

Cases are related by various authors, in which amaurosis appeared to arise from exposure to cold, or sudden suppression of perspiration. Thus, Arrachart mentions the case of a young woman, who during the excessive heat of summer, having carried a load of clothes to the river, and arriving in a state of profuse perspiration, plunged her hands into the water. The cold seized her, her skin became instantly dry, and in less than a quarter of an hour she was deprived of sight. He relates also the case of a very corpulent young man, who having remained for a long time in a room strongly heated by a stove, had the imprudence to go out while completely perspiring. The cold air suddenly suppressed the perspiration. He went to bed with violent headach, and next morning awoke blind. In both cases, the pupils remained black, dilated and immovable, the eyes fixed and stupid, and the body oppressed and actionless.[37]

Treatment. The general treatment consists in depletion by blood-letting and purging, followed by the use of diaphoretics and alteratives. Calomel with opium, Dover's powder, guaiac, camphor, and sarsaparilla, prove essentially serviceable.

Amongst external applications, vesicatories hold the chief place. They are to be applied alternately behind the ear, on the temple

and on the forehead, so that a continued succession of them may be kept up.

Case 309.—J. Powell, a very healthy old man, 77 years of age, had been for many years subject to an excessive perspiration from the feet, more especially upon taking any exercise. This tendency had for several years been so great an inconvenience, so as to oblige him sometimes to change his stockings several times in the course of the day. He was one day advised by a neighbour to apply the fresh leaves of dock to his feet, and was assured that this would effectually cure his complaint. Accordingly he laid a single dock leaf to the sole of each foot, and very soon perceived that they had taken effect. He felt a sensation of tingling and irritation whenever the leaves came in contact with the skin. Within half an hour after they were applied, he experienced great uneasiness and pain in the head. This pain soon became very distressing, particularly over the eyes, which it is remarkable were so quickly affected, that before the leaves had been applied an hour, he was nearly totally blind.

On being admitted into St George's Infirmary, it appeared that he could perceive a strong light, and could make out the figure of an opaque object, placed between him and a clear light. Such objects appeared involved in a thick mist. During the following night, the pain in the head totally deprived him of sleep; but he had no constitutional disturbance, or disposition to fever. Next day, he was much the same. There was no action of the iris of either eye, on exposure to various degrees of light. The pupils remained fixed, in a state of permanent contraction. He was, however, still able to perceive when he was brought near a window; but this was all he could make out.

A blister was applied behind each ear, and others to the lateral parts of the feet. Small doses of calomel were ordered at short intervals, with a view to bring his system under the mercurial influence. As soon as the blisters began to operate and become painful, he perceived the pain in the head and affection of sight relieved. By the time they were dressed, at the usual period of 24 hours after their application, he was able to distinguish many objects with tolerable precision, which were before totally invisible. Dressings of an irritating kind were applied, as it was deemed necessary to keep up a considerable discharge for sometime. It was also directed, that his feet should be immersed in warm water, morning and evening, and afterwards wrapped very warmly in flannels, to restore, if possible, the wonted freeness of perspiration.

Under this treatment, the patient was gradually restored to health, losing the distressing pain in his head, while he every day found his sight improve. The mercurial course affected his mouth rather smartly, and under its influence he had the comfort to find himself entirely relieved of the little remaining headach, and very nearly the whole of the affection of his eyes. He had previously enjoyed a clearness of sight very rare at his age, and after his recovery, his vision became nearly, though not quite as good as it had been before the suppression of the perspiration from his feet. On leaving the infirmary, he was recommended to wear a piece of oiled silk, wrapped round each foot, with a view to encourage the insensible perspiration.[38]

§ 17. *Amaurosis from congestion of the nervous optic apparatus, produced by poisons.*

Almost all substances included under the classes of narcotic and narcotico-acrid poisons, produce, along with other effects on the nervous system, dimness of sight and dilated pupils. Dilatation and fixedness of the pupils follow the application of some of these substances even to the skin merely, and of this we take advantage in the treatment of several of the diseases of the eye; but it does not appear, that, employed in this way, belladonna and hyosciamus produce any other effect upon the function of vision, than a degree of obscurity and dazzling, such as the mere influx of light through

a much dilated pupil might produce. Taken internally, however, these poisons, as well as many of their congeners, cause insensibility of the retina, accompanied by mydriasis in most instances, but sometimes by myosis. They also cause flushing of the face, delirium, spectral illusions, coma, convulsions, and, if not speedily counteracted, death.

The effects of large doses of belladonna have been frequently witnessed, in consequence of children and adults being tempted, by their fine colour and bright lustre, to eat the berries of that plant. Dryness of the throat is an almost uniform symptom in such cases, and, along with difficulty in swallowing, is much complained of by the patient. The delirium is generally extravagant, and accompanied with immoderate and incontrollable laughter, sometimes with constant talking, but occasionally with complete loss of voice. The eyeballs are red and prominent. Vision is more or less affected; sometimes so much so that even the brightest light cannot be distinguished. The torpor or lethargy which follows the delirium, occurs more or less quickly, but in general not for several hours after the poison is taken. Convulsions rarely appear to be produced by belladonna. The effects of this poison are by no means so quickly dissipated as those of opium. The blindness, especially, is often a very obstinate symptom, sometimes remaining long after the affection of the mind has disappeared. For days, and even weeks, the pupils continue dilated, and vision disordered.

Similar effects are produced by large doses of hyosciamus or stramonium.[39] Blindness, with dilated pupils, also attends poisoning by dulcamara, white hellebore, tobacco, and several other substances. Opium and alcohol[40] also induce insensibility of the retina, accompanied at first with contraction, but on the approach of death, with dilatation of the pupils.

It becomes a question of great importance, How do the narcotic and narcotico-acrid poisons act in the production of amaurosis? Do they operate, through the medium of the nervous system, on that part of the brain which forms the immediate organ of visual perception, on the optic nerve, the motor oculi which animates the iris, and the other nerves connected with the eyeball and eyelids? Or do they merely induce congestion of the vessels of the brain, and sometimes extravasation of blood within the head? They probably act in both these ways. Congestion of the cerebral vessels is commonly, though perhaps not invariably, found on dissection, after death from a narcotic or narcotico-acrid poison, and must undoubtedly tend to produce insensibility in cases of poisoning, as it does in cases of apoplexy or cerebral plethora. But that the amaurotic effects of the poisonous substances in question are to be ascribed wholly to congestion does not appear probable, when we take into account the dilatation of the pupils, which, often in the course of not many minutes, follows the application of belladonna to the skin of the eyelids, and which, whether it is to be regarded as produced by nervous communication or by absorption, can scarcely with any degree of plausibility be supposed to arise from cerebral oppression.

I have already had occasion repeatedly to hint my suspicion, that one of the narcotico-acrids, which custom has foolishly introduced into common use, namely tobacco, is a frequent cause of amaurosis. A majority of the amaurotic patients, by whom I have been consulted, have been in the habit of chewing, and still oftener of smoking tobacco, in large quantities. It is difficult, of course, to prove that blindness is owing to any one particular cause, when perhaps several causes, favourable to its production, have for a length of time been acting on the individual; and it is especially difficult to trace the operation of a poison, daily applied to the body, for years, in such quantities as to produce, at a time, only a very small amount of deleterious influence, the accumulative effect being at last merely the insensibility of a certain set of nervous organs. At the same time, we are familiar with the consequences of minute portions of other poisons, which are permitted to operate for a length of time on the constitution, such as alcohol, opium, lead, arsenic, mercury, &c. and we can scarcely doubt, that a poison so deleterious as tobacco, must also produce its own peculiar injurious effects.

It would appear that there are two principles of activity in tobacco, an essential oil, and a peculiar proximate principle called nicotin, both of which are capable of producing death, but by very different physiological actions, the former by its effects on the brain, the latter by its influence on the heart. The essential oil is so virulent a poison, that small animals are almost instantly killed, when wounded by a needle dipped in it, or when a few drops of it are let fall upon their tongue. Dr Paris[41] records the case of a child, whose death was occasioned by her having swallowed a portion of half-smoked tobacco, which was taken from the pipe of her father, and in which there no doubt existed a quantity of essential oil, which had been separated by the act of smoking; for in the process of smoking, the oil is separated, and being rendered empyreumatic by heat, is thus applied to the fauces in its most active state. That the regular application, in this way, of a poison of such power, perhaps five or six times daily for months or years together, should at length be productive of serious effects on the nervous system, and especially on the brain, cannot surely be matter of wonder. Indeed it would be surprising if it were otherwise.

The Germans accuse a variety of bitter substances, employed either for food or medicine, as productive of amaurosis; but with what degree of justice, I cannot pretend to say. Beer enumerates bitter almonds, the root of succory, quassia, and centaurium, amongst this class.

Lead-colic is not unfrequently attended by amaurosis, as well as by deafness, vertigo, delirium, epilepsy, and other nervous symptoms.[42]

Treatment. 1. If amaurosis be the consequence of a large dose of a narcotic, which still remains in the stomach, we ought in general to begin by giving a dose of tartar emetic, or sulphate of zinc, in as small a quantity of water as possible; for, as long as the

narcotic remains in the stomach, the addition of any fluid which would not immediately be rendered by vomiting, would only dissolve the poison, if it has been swallowed in the solid state, and add to its activity. Vinegar, especially, which has been found so useful in removing the disease which arises from opium, only adds to its activity, if it be given before the poison has been rendered from the stomach. When no danger, however, of this kind, is to be apprehended, as is the case in alcoholic poisoning, injections into the stomach, by means of the stomach-pump, and the immediate abstraction of the injected fluid, along with the poisonous substance, are to be preferred. As soon after the contents of the stomach have been evacuated as is proper, a strong purgative ought to be administered, especially if we suspect that the narcotic has begun to traverse the intestines.

2. Blood-letting, both general and local, is of great use in cases of amaurosis from narcotic poisons. This remedy probably proves serviceable, chiefly by relieving the tendency to cerebral congestion, which uniformly accompanies this amaurosis.

3. The disease produced by the narcotic, and of which the amaurosis is a part, ought next to be combated by strong doses of coffee, camphor, vinegar, and the vegetable acids.

4. Cold applications to the head and eyes have been found useful. The cold affusion on the head is particularly advantageous, when the symptoms are owing to the ingestion of opium or of alcohol.

5. In inveterate cases, after premising blood-letting and purging, a course of mercury may be tried, with counter-irritation of different sorts, sternutatories, and electricity. The prognosis in this stage, is very unfavourable, if the pupils are fixed, the retina insensible, and the external vessels of the eye varicose.

6. The purgative plan of curing lead-colic is generally successful in removing the amaurosis, which sometimes attends that complaint.

Case 310.—On the 24th May 1815, Mr J. H. aged 19, unaccustomed, except for a day or two before, to the effects of tobacco, smoked one, and part of a second pipe, without employing the usual caution of spitting out the saliva; and partook, at the same time, of a little porter. He became affected by syncope, with violent retching and vomiting. He returned home, complained of pain in the head, undressed himself, and went to bed. Soon afterwards he was taken with stupor and laborious breathing.

He was found in this state by the medical attendant. The countenance was suffused with a deep livid colour; the eyes had lost their brilliancy; the conjunctivæ were injected; the right pupil was exceedingly contracted; the left was much larger than usual, and had lost its circular form; both were unaffected on the approach of light. The hands were joined, and in a state of rigidity; the arms bound over the chest; and the whole body affected with spasmodic contraction. The breathing was stertorous; pulse about 80 or 82, and nearly natural in other respects. No more vomiting; no stool or urine passed; no palsy.

Fourteen ounces of blood were immediately taken from the temporal artery, and vinegar was administered. He revived evidently; the countenance became less livid; the spasmodic affection of the hands ceased; respiration became less stertorous. An ipecacuanha emetic was given, and operated once, and afterwards some purgative medicine was administered.

He dozed through the night. Next morning he was affected with syncope,

during the efforts made to get out of bed to go to stool. He complained very much of pain of the head and eyes; the eyes and eyelids appeared red and suffused. Tongue loaded and brownish. One stool. Pulse 80 and natural. Continued to doze. The feet cold in the morning. Sixteen ounces of blood were taken from the arm.

On the third day, he still dozed, and complained of pain in the head, nausea, and a tendency to faint. Countenance more natural; pupils natural, and contract on exposure to light. Pulse 72. A loose stool passed insensibly in bed. In the evening, he again became affected with a degree of stupor, spasms of the hands, and stertor in breathing. Six ounces of blood were drawn from the temporal artery, vinegar was given, a blister applied to the forehead, and mustard cataplasms to the feet, with much relief to the symptoms.

On the fourth day, he appeared much as on the preceding morning. There was some pain of head, but no sickness or vomiting. After this he gradually recovered.[43]

§ 18. *Amaurosis from congestion or inflammation of the nervous optic apparatus, depending on acute or chronic disorders of the digestive organs.*

Every person, liable to occasional fits of dyspepsia, makes mention of certain symptoms affecting the organs of vision; as, distension and stiffness of the eyeballs, dazzling and mistiness before the eyes, muscæ volitantes, and the like. These symptoms are generally attended by headach, and sometimes by vertigo, and gradually subside as the stomach recovers its wonted activity. The French distinguish by the name of *éblouissement*, a sudden temporary loss of sight, sometimes nearly complete, and attended generally with severe pain in the stomach and sometimes in the forehead. Such fits occur from time to time in the course of the day. They alarm the patient, especially when they attack him in the street. In some cases, the sympathetic effects of indigestion are not so transient, consisting in dilatation of the pupils, sluggishness in the motions of the iris, and a continued dimness of sight. The patient complains, at the same time, of constant acid or foul eructations, with painful heartburn, a feeling of pressure at the scrobiculus cordis, distension of the abdomen, a great degree of flatulence, thirst, nausea, general uneasiness and restlessness; the mouth is bitter, the tongue foul, and the pulse accelerated.

All these symptoms, including, among the rest, the amaurotic, speedily subside, in general, after the use of some absorbent and laxative medicine, as magnesia usta, or the carbonate of magnesia, a mixture of these with rhubarb and ginger, or the like. Those who are subject to *éblouissement*, have recourse to a dose of calomel, followed by a purge, which frees them from such attacks for a time.

In some instances, it is between the optic apparatus and the bowels, more than the stomach, that the sympathy exists, which gives rise to temporary amaurosis. Tiedemann[44] quotes from Helwich the case of a hypochondriacal man who became blind under severe spasmodic attacks with costiveness. After the use of clysters, the blindness left him.

Frequently-repeated and neglected attacks, however, of the kind above noticed, especially in sedentary persons, careless perhaps of

their diet, and inattentive to the means of preserving health, lead at last to more serious consequences. The optic apparatus is at first affected only with a sympathetic congestion, but as in all other sympathetic affections, if often repeated, the eye retains at length the morbid action, and permanent amaurosis is developed. Each succeeding attack of the purely sympathetic kind continues longer than the preceding, and at last the congestion of the brain ends in such structural changes as do not yield to mere evacuations of the stomach and bowels. The bowels grow habitually inactive, the biliary organs are impeded in the discharge of their office, the appetite is impaired, digestion weakened, the mind becomes habitually fretful, and the spirits depressed. Under such circumstances, allowed to continue without interruption for years, there is not unfrequently produced a slowly increasing weakness of sight, terminating at last in confirmed amaurosis. In Milton, whose case I apprehend to have been one of this sort, the affection of vision went on for ten years before it ended in blindness; and it sometimes happens, that even a longer period elapses, before the disease is fully developed. The patient during all this time, complains of a constantly increasing imperfection of sight, without being rendered unable, perhaps, to continue his usual employments. Though generally slow in its progress, yet there sometimes occur cases, in which this species of amaurosis is rapid, or even metastatic.

The pupil is dilated, the motions of the iris very sluggish and limited, the sclerotica tinged of a yellowish or dusky hue, the vessels of the conjunctiva often turgescent. Every object seems to the patient to be enveloped in a thick cloud, and not unfrequently he sees only parts of the objects at which he is looking. Dull, stupifying headach generally accompanies the failure of sight, extending over the whole head, and depriving the patient, even when a considerable share of vision remains, of all pleasure in those employments which require the exercise at once of sight and thought.

Amaurosis, arising from disorders of the digestive organs, is not always easily distinguished from that which depends on structural changes in the encephalon, attended with a train of symptoms which are referred to the stomach, but which really depend on disease in the brain. Patients are very apt to deceive themselves under such circumstances, regarding the seat of their diseases. They perhaps refer all their sufferings to the stomach, but after death, not a trace of disease is detected in the viscera of the abdomen, while in the membranes or in the substance of the brain, there are indubitable marks of such structural changes of long standing, as were sufficient to produce the amaurotic affection, and must at the same time have operated sympathetically on the stomach.

Treatment. A relinquishment of whatever appears to have laid the foundation of the affection of the digestive organs is the most important particular in the treatment of this amaurosis; whether the cause has been severe and protracted study, irregularities in diet, the use of alcoholic and other poisons, want of exercise, im-

pure air, or the like. The patient's food should be plain and easily digested, he must pay particular attention to keep his bowels regular, he ought to take daily exercise in the country on foot or on horseback, and court the society of the cheerful and well-informed.

Depletion, and especially the application of leeches to the temples will be found of much service. The head is to be shaved, and kept wet with cold cloths. Counter-irritation, by blisters behind the ears, is sometimes necessary. Alterative doses of mercury will often be useful, and much advantage will be reaped from the use of tonic medicines, judiciously selected and combined.

Beer strongly dissuades from the use of emetics and nauseating medicines in the treatment of amaurosis depending on chronic disorder of the digestive organs; also, from all external stimulants, and from electricity or galvanism.

Case 311.—Scarpa relates the case of a girl, aged 16 years, of delicate constitution, and who had not menstruated, who towards the end of May became affected with such a degree of morbid appetite, that she could scarcely satisfy it by swallowing every sort of gross food in large quantity, especially bread made of Indian corn. Fatigued also by the hard labour of the country, to which she was not yet accustomed, her sight began to grow dim. Her immoderate appetite suddenly ceased, she felt a bitter taste in her mouth, and began to experience a sense of weight in the region of the stomach, accompanied by nausea and continual headach. She then lost the sight of the right eye entirely, and in a great measure that of the left. The pupils were considerably dilated, and almost immovable to the strongest light. She seemed also, as if she had an incipient strabismus.

On the 4th of June, she took, in table-spoonfuls, a solution of 4 grains of tartar emetic in five ounces of water, which produced a great and continued degree of nausea, but no vomiting, except of a little viscid whitish matter. On the 5th the same emetic was repeated in the same manner. It produced a more copious vomiting than on the preceding day; but always of mucous whitish matter. The headach, however, was considerably relieved, as well as the sense of weight in the region of the stomach. The nausea, however, and furred tongue continued as at first. The pupil appeared a little moveable to bright light, and with the right eye the patient could distinguish whether it was light or dark. She began to expose the eyes to the vapour of ammonia every two or three hours. On the 6th, she had little pain in the head, and the mouth was less bitter. The pupil had acquired some degree of motion. She was ordered to take three resolvent powders (see p. 854) daily, and to continue the ammoniacal vapour. On the 7th she had very little headach. The powders produced nausea for some hours, then two copious stools. The pupil contracted a little, and the patient could discern the outlines of large objects. By the 8th, the headach was entirely gone, as well as the bitter taste and furred state of the tongue. The pupil also was more sensible. The patient continued to take the resolvent powders on the 9th, 10th, 11th, and 12th, and to use the ammonia. On the 13th, she complained again of headach, and bitterness of the mouth, with foul tongue. Instead of the powders, Scarpa prescribed an emetic of half a drachm of ipecacuanha with a grain of tartar emetic, in consequence of which the patient vomited much yellowish-green matter. The headach ceased immediately, and the girl could then distinguish sufficiently well the objects that were presented to her. On the 14th, she felt herself very well. The pupil of the right eye, which had been the most amaurotic, was even more contracted than that of the left. On the 15th, the patient resumed the use of the resolvent powders, and continued the external application of the ammoniacal vapour. On the 16th, she could distinguish with the right eye a small needle. During the 17th, 18th, 19th, and 20th, the powders produced two copious stools daily, without at all weakening the patient. She had a good appetite, and digested well. On the 21st a decoction of cinchona, with infusion of valerian root, was substituted for the resolvent powders. She was able in a few days to see the most

minute objects, as well with the one eye as the other. She had acquired a good complexion, and the strabismus had almost entirely disappeared. She was dismissed perfectly cured, but advised to continue the use of the vapour for a week longer, to take morning and evening a powder, composed of one drachm of cinchona, and half a drachm of valerian, to observe a regular diet, and to avoid the scorching rays of the sun.[45]

Case 312.—A gentleman of feeble habit, was subject to occasional attacks of obstinate constipation, each accompanied by amblyopia, sometimes proceeding to complete amaurosis. When Mr Edwards was first called to visit this patient, he found him completely amaurotic. He had sometime before complained of excruciating headach, and every solid and fluid medicine directed by his medical attendant had been rejected by his stomach. To the previously existing amblyopia complete amaurosis succeeded, during the vomiting, which may be called spontaneous, in contradistinction to that produced by an emetic in another attack. The patient now became delirious.

Leeches were applied to the abdomen, and the bowels were relieved by enemas. By these means, and the application of cold to the head, the patient fully and speedily regained his sight and faculties.

In this attack, the co-existence of headach and delirium, and the recovery by antiphlogistic treatment, Mr Edwards considered as sufficiently indicative of active local congestion, or incipient inflammation in the nervous structure of the eyes. This was coincident with great debility, and the amaurosis was not completed till vomiting occurred.

After an interval of six weeks, another attack of visceral obstruction succeeded: the accompanying amaurosis was incomplete; vomiting was absent. The amaurotic affection lingered for a considerable time, surviving the removal by enemas &c. of the primary irritant longer than in the preceding attack, in which the vascular congestion was almost purely sympathetic and temporary.

By some errors in regimen, the patient in a few weeks again relapsed. There were constipation, tense hypochondria, nausea, headach, and amblyopia. Mr Edwards now tried the continental practice, by giving an emetic. The result was a discharge of much yellow-greenish matter, but the amaurosis immediately became complete. The bowels were relieved by enemas, but still the blindness continued much longer than in any previous attack, and was only at length removed by the application of many leeches to the temples, and continued evaporating lotions to the head.

In each of the attacks, the degree of amaurosis was determined by the presence or absence of vomiting, the complete being synchronous with spontaneous vomiting, as in the first attack, and with the action of an emetic, as in the last; where there was no emetic action, as in the second attack, the amaurosis was incomplete.

Mr. Edwards considers the emetic practice to be contra-indicated in amaurotic affections, alleging in support of this opinion, the tendency of obstinate vomiting, in incipient pregnancy, to cause amblyopia or even complete amaurosis.[46]

Case 313.—Thomas Crighton, aged 23, was admitted into St Bartholomew's Hospital, on account of a palsy of his limbs. About a year before, while the use of his limbs was yet unimpaired, he was attacked repeatedly with violent pain in the bowels, uniformly preceded by costiveness, and, generally, terminated by a copious discharge of loose, fœtid, black stools. The relief afforded by the diarrhœa was speedy and uniform. In the course of six months his lower extremities became affected with occasional twitchings, and he found that he could not regulate their motions in walking: this increased to such a degree as to make him incapable of taking any exercise. He had, at the commencement of his illness, a confusion of vision, and a constant and violent pain in the head. The former symptom increased so much, that he could discern no object distinctly: a candle, for instance, although held near him, appeared as large as the moon. The sensation of his lower extremities continued perfect; but the actions of the bladder were no longer under the control of the will: the urine sometimes flowed involuntarily, and, at others, was retained for some hours, with considerable pain. He afterwards began to lose the use of his upper extremities: the left hand and arm were more affected than the right; but there was no difference in the affection of the leg on the same side. His speech, also, became much im-

paired; he hesitated and faltered considerably, and the tones of his voice were irregular, so that, at length, he could scarcely make himself understood. At the time of his admission into the hospital, there was an entire loss of voluntary motion of the lower extremities, and a great diminution of that of the upper. The bowels were deranged; there was constant headach; the speech was very indistinct; and vision so imperfect, that he could not read the largest print.

An issue was made in the neck, and some medicines were prescribed, under the direction of the physician. As the treatment did not prove beneficial, Mr Abernethy was desired to examine the spine, and found such a curvature and projection of the spinous processes of the upper lumbar and lower dorsal vertebræ, that he thought the bodies of those bones were diseased. He was, therefore, inclined to attribute the paralysis of the lower extremities to the disease of the spine; and, consequently, directed, that issues should be made on each side of the projecting vertebræ. As this supposition would not account for the paralytic affection of the parts above, and as the bowels were deranged, Mr Abernethy ordered 2 grains of calomel with 8 of rhubarb, to be taken twice a-week, and some infusion of gentian, with senna, occasionally.

After using these medicines for about three weeks, the patient's bowels became regular, the biliary secretion healthy, and his appetite good. He could move his hands and arms nearly as well as ever; and his eyesight was so much improved that he could read a newspaper; indeed, it was nearly well. The functions of the bladder were completely restored; his speech became articulate; and his general health, in every respect much improved. He remained in the hospital about two months, but with very little amendment in the state of the lower extremities.[47]

Case 314.—Elizabeth Healey, a slender delicate young woman, about 25, of a sedentary occupation, emaciated figure, and feeble melancholic temperament, applied to Mr Lessey on the 9th of June 1820, for relief of an affection of the bowels, to which she had been liable for several years, requiring, even in a state of comparative convalescence, the constant use of purgatives. Indeed, the derangement of the abdominal viscera was so great and permanent, as to induce a belief that it was of an organic nature. In addition she was liable to frequent and severe cephalalgia, and occasionally to attacks of dyspnœa, with spasms of the chest and throat, which, on her attempting to swallow, produced alarming symptoms of suffocation. These attacks were sudden and violent, were attended by great feebleness of the voice, and succeeded by exhaustion. Her bowels had been frequently relieved by mercurial and saline cathartics, the attacks of cephalalgia by venesection and the application of leeches and blisters to the head and neck, and the affection of the lungs by a variety of remedies. She had an attack of disordered bowels in January 1821, which appeared to be yielding to remedies, when she was suddenly seized, on the 23d, with violent dyspnœa. Every attempt to swallow, or even to speak, was followed by a convulsive spasm of the throat and chest, attended with frequent sobbing.[48] A few doses of ether and opium, with a blister on the sternum, relieved the immediate urgency of the symptoms; but still the breathing continued laborious, and the voice, which had long been feeble, was reduced to a scarcely audible whisper. The derangement of her abdominal viscera returned; her stools were green and slimy; her pulse was feeble and her general debility so great, that Mr Lessey despaired of her recovery.

She remained in this state, with little variation, till the 15th of February, when the difficulty of breathing suddenly left her, and her voice became distinct, strong, and clear; but a sudden and violent pain seized her head, and, to the astonishment of the people around her, she screamed out loudly for help. Hastening to her assistance, they found her in an agony of pain, and quite blind. Mr Lessey immediately ordered her head to be shaved, and a blister applied to it, with a dozen of leeches to the temples, which abated the violence of the pain, but produced no alteration in her sight. The eyes were fixed and nearly motionless; the pupil steady at a medium point, between contraction and dilatation, and totally insensible to light. On presenting a candle suddenly to her eyes, she exhibited no consciousness of its presence, unless it was sufficiently near for her to feel the warmth of its rays. Blisters were applied to her temples, dressed with cantharides ointment, and frequently repeated, so as to keep up a discharge for weeks. The

bowels continued torpid, and required the constant use of purgatives. Blue pill was next tried, and her gums were slightly affected, but without any effect on her sight. Her voice continued strong, her breathing easy, and, in fact, the affection of the chest appeared to have left her entirely. The pain in the head was considerably abated, but the vision remained so entirely lost, that all hopes of its recovery were abandoned, and she was sent to the Manchester workhouse, as an incurable amaurotic.

Three months after her admission, she had a severe attack both in her chest and bowels, obstinate constipation, dyspnœa, with violent spasm, and great difficulty of swallowing. This attack lasted three weeks and subsided slowly. At the latter end of 1822, she had a slight attack of pleurisy, which yielded to bleeding, blistering, and the usual treatment; after which she remained tolerably free from all her complaints, excepting slight headachs.

Although she entertained little or no hope of again recovering her sight, yet she occasionally tried her eyes with a candle. On the evening of the 29th of October, she perceived no glimmering whatever; but, to her great surprise, on the following evening, as a person was conducting her through the streets, she saw a confused appearance of fire, and exclaimed, *What is the matter with my eyes?* In the course of a few minutes, she discovered that it proceeded from the gas lamps, which she saw indistinctly. Her sight gradually improved during the course of the evening. Next day Mr Lessey found that there was considerable mistiness and obscurity in her vision, with muscæ volitantes of a fiery hue; but that she could distinguish the features of her acquaintances, and could even read the large capitals of a hand-bill, the smaller print seeming confused, and blended together. All distant objects were mixed up with coloured mists, and consequently indistinct and confused.

On the 20th of November, her sight remained much the same. It had got better, however, during the interval, but was injured again by injudicious exposure to a highly heated room. The coloured mists still troubled her occasionally; the muscæ volitantes were sometimes very numerous, and appeared mixed, she said, with white flakes like snow. She could not read better; but, with the help of a double-concave glass, she could distinguish print, which, to her naked eye, was a confused mass. Her bowels and lungs had been free from disease for 12 months, and she exulted in the prospect of ultimate recovery.[49]

§ 19. *Amaurosis from congestion or inflammation of the nervous optic apparatus, arising from continued loss of the fluids of the body.*

This species of amaurosis declares itself from its commencement by the sensation of a net-work before the eyes, seldom, if ever, attended by that glittering or dazzling which accompanies the same symptom in some other varieties of the disease. In a gentleman by whom I was consulted, and who blamed excessive indulgence in venery as the cause of his blindness, there was no photopsia or revolving of globes of light before the eyes, but the sensation of a cloud, which crept first over the one eye, and then over the other, from the temple towards the nose, as if the nasal part of the retinæ became first insensible. During the progress of the disease, the power of vision manifests remarkable differences in degree, according to the physical and moral influences which affect the individual. After a hearty meal, or a few glasses of wine, or during the influence of some unexpected elation of mind, the patient sees for a short time much better than he did before; while an opposite effect is produced by the depressing passions, want of food, continued watching, and the like. Not unfrequently, this amaurosis first

declares itself by the sensation of a mist before the eyes in the evenings, the common artificial light being too weak to affect sufficiently the diminished sensibility of the nervous apparatus of vision. In some cases, the symptoms creep on so slowly that the patient is scarcely sensible of their increase, till he becomes completely amaurotic. There is seldom any complaint of pain, either in the head, or in the eyes, or any feeling of fulness or weight. The patients are often melancholic, timid, and hypochondriacal; they are subject to vertigo, loss of memory, incapacity for mental exertion, capriciousness, sleeplessness, gastralgia, want of appetite, flatulence, and constipation. There are rarely any objective symptoms, except perhaps dilated pupils, attended by evident general debility, paleness, emaciation, palpitation of the heart, and a weak, small, and frequent pulse.

Causes. Among the most frequent causes of this amaurosis may be mentioned, any considerable and continued loss of the fluids of the body, such as occurs in hæmorrhagy, ptyalism, chronic diarrhœa, immoderate venery, spermatorrhœa, onanism, undue suckling,[50] leucorrhœa, or the abuse of reducing remedies. It is occasionally a sequela of typhus fever, especially when this disease has been attended by profuse epistaxis, or treated with remedies producing hypercatharsis. Grief and other depressing passions, produce wasting of the body, with cerebral congestion, and amaurosis.

It has already been mentioned, that plethoric persons are in general able to produce a degree of congestive amaurosis at will, by stooping, for example, or by tying their neckcloth tight. We also frequently witness a temporary amaurosis from exhaustion. Amongst the symptoms enumerated as caused by loss of blood in pregnant females before labour, we find vertigo, singing in the ears, and impaired vision. If the nervous system is the seat of no particular excitement at the time, we observe that on the sudden abstraction of blood by phlebotomy, the organs of vision, and indeed all the organs of sense, are strikingly enfeebled. In some individuals the debility continues for several days, and if any one of the organs of sense has been previously weaker than the rest, the feebleness of that organ is often increased. When syncope is produced by loss of blood, sight appears to be the sense which fails first, and which recovers last. Hearing is next; while smell, taste, and touch are less affected, and more easily reanimated, by excitation. They return in a very short time to their natural state; but it is not so with sight. It is a popular opinion, that blood-letting weakens the sight, and to a certain length the opinion is founded on fact.

Treatment. The general object of the treatment is by diet and tonic remedies, to strengthen the digestive organs, and remove the debility of the patient. Although it is but too true, that the amaurosis does not always yield, even when the bodily strength of the patient is renewed, still the utmost care must be paid that debilitating discharges are restrained, and bad practices on the part of the patient avoided; while country air, moderate exercise, the cold

bath, and every other general influence likely to restore vigour, are employed.

When spermatic discharges are the cause, the plan of cauterizing the prostatic part of the urethra, recommended by Lallemand,[51] may be tried, and followed up with tonics.

Some of the causes already referred to, unquestionably produce cerebral congestion, which, notwithstanding the debilitated condition of the constitution, requires the application of leeches to the head and of counter-irritation. Mr Wade recommends[52] moxas burnt slowly over the integuments of the head.

Local stimulants, such as ethereal vapours directed against the eyes, have been found of use in such cases.

Success in treating this disease will depend much on the practitioner's discovering the particular debilitating cause from which it has originated; and when the disease is recent, the mere avoidance of the cause will frequently be sufficient to arrest its progress. When lactation, for instance, is the cause, weaning is the principal remedy.

Case 315.—Arrachart relates the case of a young man, who had all his life been accustomed to drink wine as his ordinary beverage, but who, from change of place, was obliged to drink water only. Diarrhœa was the consequence. This continued for nine months, when the patient was seized with fever of intermittent character. For this he was bled twice at the arm, and from that moment his sight began to fail. A third bleeding, from the foot, sensibly increased the weakness of sight, and immediately after a fourth bleeding, also from the foot, the patient became altogether blind. Large blisters were applied, and tartar emetic given, first of all as a vomit, and then as an alterative, during more than a month, without any success. The exhaustion of the patient rapidly increased, and still the tartar emetic was repeatedly employed. When Arrachart was called in, he prescribed mild, nourishing, and easily-digested food, and put a seton into the neck. The patient's health began to improve, but his vision remaining as before, he still continued to take six-grain doses of tartar emetic, without Arrachart's knowledge. These produced convulsions, without any evacuation. Arrachart having discovered this, prescribed some anodyne and antispasmodic remedies, and recommenced the nourishing plan of diet. In two months the patient began to see a little with the left eye, and during the course of the next three months the vision of that eye sensibly improved, but the right eye remained blind.[53]

Case 316.—A mason was admitted into the *Hôtel-Dieu*, under the care of Dupuytren, having found himself deprived of sight the day after his wedding. The cold bath, irritating friction over the dorso-lumbar region, and diffusible tonics internally, were employed, and vision was speedily restored.[54]

Case 317.—A country lad, of robust constitution, became the alternately favoured paramour of two females, his fellow-servants, under the same roof. He was the subject of gutta serena in less than a twelvemonth.[55]

Case 318.—Another, at an early period of puberty, suddenly fell into a despondency, and shunned society. He never left his chamber but when the shade of night concealed him from observation, and then selected an unfrequented path. It was not discovered till too late, that in addition to other signs of nervous exhaustion, a palsy of the retina was the consequence of habitual masturbation.[56]

Case 319.—Elizabeth Firman, aged 20, applied to Mr Wells, on the 28th January 1832, with total loss of sight, complete palsy of the left, and partial palsy of the right upper eyelid. From the leucophlegmatic and relaxed appearance of the patient, Mr Wells was led to suspect that leucorrhœa was perhaps the principal cause of her complaints, and on inquiry learned that, commencing to menstruate at the age of 16, she had continued to do so regularly for upwards of 18 months,

after which period she became very irregular and had an excessive mucous discharge, which had greatly impaired her constitution.

About two years before consulting Mr W. she had a severe ophthalmia, but which quickly got well under treatment. Shortly after this, palsy of the eyelids supervened, and vision gradually became very obscure, until it was wholly lost, first in the left eye, and soon after in the right. When the eyelid was raised, and the light allowed to pass on to the retina, neither contraction nor dilatation of the pupil followed, but the patient complained of great pain at the back part of the orbit. The pupil had an oval shape, with an irregular edge.

For 12 or 18 months before consulting Mr Wells, the patient had pain in the left side, behind and below the false ribs.

During the course of the disease, she was admitted into a public hospital, where she remained for eleven weeks, and was treated by cupping, blistering, and mercury, but without benefit. She also tried electricity, but with no better success. On the contrary, the symptoms increased under those means, and the left eye became totally insensible to the strongest light.

Although of opinion that the whole symptoms arose from the affection of the genital system, Mr Wells also felt assured of the existence of cerebral congestion, and therefore began his treatment of the case with taking blood from the nape of the neck by cupping, followed by a brisk purge of calomel and jalap.

Some days after, the skin being dry, and the tongue furred, he ordered ten grains of nitre thrice a-day, and every night five grains of extract of hyoscyamus, five of compound extract of colocynth, and two of blue pill. A solution of alum and sulphate of zinc was directed to be injected into the vagina thrice a-day. In this plan, with the use of occasional purgatives, the patient persevered for more than a month, with but little change on the symptoms. As she then complained of pain at the back of the head, she was bled at the arm to 18 ounces, and the first purgative was repeated. She was ordered strictly to attend to the injection, and to take the night pills for another month. This she did, and with good effect, as, by the end of that time, she was able to raise one eyelid, and with one eye could distinguish objects. Eleven weeks from the time Mr Wells first saw her, she felt a sharp pain, which she explained to be as if something had suddenly parted at the back part of the head; and at that moment a slight glimmer of light was first experienced with the other eye. Mr Wells bled her again to 12 ounces; and the power of vision went on gradually to return.

Four months from the period of commencing the injection, she was able to read and work, and her health was greatly improved. When Mr Wells drew up the case, she was as well as ever she had been in her life; the leucorrhœa had entirely ceased, and menstruation had become regular. He mentions, that in addition to the pills, ʒss. of carbonate of iron was administered thrice a-day, when the vision began to return.[57]

Case 320.—Mrs S. when in her 30th year, was brought to bed; and being a woman of a healthy constitution, chose to suckle her child herself. This she did for some time, without feeling any inconvenience from it; but, having continued it for six weeks, her strength began to fail, and continued to decline daily till she became incapable even of moving about the house, without experiencing a very painful languor. About the same time her sight also was affected; at first only in a small degree, but afterwards so considerably, that the full glare of the mid-day sun appeared to her no stronger than the light of the moon. At this period of her disorder, no black specks were perceived with either eye, nor did objects at any time appear covered with a mist or cloud. She was affected with a violent pain in the neck, running upwards to the side of the head; and, on this account, the person who attended her, thought proper to take four ounces of blood, by cupping, from the part first affected. After this her sight was worse than before, and it was not long before she entirely lost the use of both eyes.

She had been three days in this state of blindness, when Mr Wathen was first desired to see her. He found both pupils very much dilated, and remaining unaltered in the brightest light. His first advice was, that the child should be weaned without loss of time. He ordered, at the same time, bark draughts to be taken by the mother three times in the day, prescribing also an opening medicine to be taken occasionally, on account of a costive habit of body, to which she had

been almost constantly subject ever since the time of her delivery. To the use of these remedies was added the frequent application of the vapour of æther to the eyes and forehead.

On the fourth day after this mode of treatment was adopted, Mr Ware visited the patient, with Mr Wathen. From the account she gave of herself, her strength and spirits seemed to be in some degree on the return; and she could now perceive faint glimmerings of light, though the pupils of both eyes were in the same dilated and fixed state as before. The bark and æther were continued, and next day a strong stream of the electric fluid was poured on the eyes, whilst several small electric sparks were variously pointed about the forehead and temples. The day after this, to increase the effect of the electricity, the patient was placed on a glass-footed stool, and the same experiments repeated as before. This appeared to have a considerable influence in promoting the cure. The first trial was almost immediately followed by such a degree of amendment, that the patient, to whose sight every object had before been confused, could now clearly distinguish how many windows there were in the room where she sat, though she was still unable to make out the frames of any of them. On the third day, soon after she had been thus electrified, the menstrual discharge came on for the first time since she had been brought to bed, and continued three days, during which it was thought proper to suspend the use both of the bark and the electricity. Immediately after this they were resumed; and the effect was that the sight mended daily. At the end of a week, she could perceive all large objects; and in a short time she could read even the smallest print. Her strength, indeed, did not return so quickly; on which account she was advised to remove into the country, where the change of air, with the help of a mild nutritious diet, soon restored her to perfect health.[58]

§ 20. *Amaurosis from irritation of branches of the fifth nerve.*

Congestion of the nervous optic apparatus, excited by irritation of the fifth nerve, appears to be by no means an unfrequent cause of sympathetic amaurosis; numerous instances being on record, in which the removal of tumours in contact with branches of the fifth nerve, or of carious teeth, has been the means of restoring sight.

Case 321.—A healthy middle-aged man, a ship-painter by trade, desired Mr Howship's advice, in 1808, on account of a small tumour situated on the crown of the head. It was at least ten years since he had first perceived it. He supposed it might have been the consequence of some blow on the part, as those in his line of business were very subject to such accidents. It had never been painful, but yet he thought his general health was giving way, as for some years he had been subject to headach, a complaint he never was afflicted with before. The frequency of the headach was increasing, and his sight had become so weak, that for more than two years he had been totally unable to read even the largest and clearest print. On pressure, no pain, or even sense of feeling, was excited in the tumour on the scalp.

Having very frequently removed such tumours, Mr Howship advised extirpation. This was done accordingly, by two elliptical incisions through the integuments beyond the basis of the tumour, the portion of included scalp, with the tumour itself, being subsequently dissected away from the pericranium, with which it was in contact. Two small vessels were tied, and the integuments brought nearly together, with adhesive plaister. In three weeks the ligatures were off, and the wound perfectly healed.

On examination, the tumour proved to be a strong cartilaginous cyst, seated in the cellular membrane beneath the scalp. The cavity of the cyst was filled with a yellow purulent fluid; the thick parts of which had formed a curdy deposite upon the sides of the cavity.

The patient had not lost above an ounce of blood in the operation, but he rather unexpectedly felt his head better the following evening, than for many months before. He found his uneasiness and pain in the head continue to diminish from day to day, and stated, with some degree of surprise, that he had also found his

sight becoming much stronger, and clearer than before. By the time the wound was healed, he had quite lost all remains of pain in his head, and his sight was so greatly improved, that he was now again able to read the same small-printed book that he had been in the habit of using ten years before; nor did the pain in the head, or the affections of the sight afterward return.[59]

Case 322.—F. Przesmycki, aged 30, who had always enjoyed good health, with the exception of occasional rheumatic pains in the head and joints, was suddenly seized in the autumn of 1825, with violent pain shooting from the left temple to the eye and side of the face. This pain was attributed to cold; it lasted several days, and then subsided, but returned periodically without being so severe as to lead him to consult a medical man. But in two months it recurred with such intensity, especially in the eye, that that organ appeared to the patient about to start from its socket, and at the same time he became sensible of having lost the power of vision on that side. This discovery induced him to have recourse to professional assistance, and for six months various plans of treatment were adopted, without any other advantage than that the pain became periodical instead of continual. At the expiration of this period, the pain acquired new force, the cheek became swoln, and during the night, several spoonfuls of bloody pus were discharged from between the conjunctiva and the left lower eyelid; after which the swelling subsided, and the pain diminished, but the blindness remained as complete as before. In three weeks a similar discharge took place, and during the next six months it was occasionally repeated. In the winter of 1826, the disease was so severe, that at the commencement of 1827, the patient proceeded to Wilna, with the intention of having the eye removed, if he should find no other means of relief.

M. Galenzowski, who was now consulted, found the vision of the left eye lost, the pupil remaining dilated. He conceived that pus had formed in the maxillary sinus, and made its way along the orbital part of the superior maxillary bone; but knowing also that suppurations of the upper jaw frequently depend upon carious teeth, a careful examination was made, and a rotten tooth found, corresponding to the antrum. This tooth was extracted, to give a new outlet to the purulent matter, and to the astonishment of M. Galenzowski and his patient, there was found attached to its root a splinter of wood, about three inches long, and as thick as the head of a pin. The splinter is supposed to have been originally detached from a tooth-pick of wood, as no other probable explanation could be given. The removal of a probe, introduced into the antrum, was followed by a few drops of sero-purulent fluid, and nine days afterwards the patient had completely regained his sight.[60]

§ 21. *Hydrocephalic amaurosis.*

Hydrocephalus is either acute or chronic, and of each of these varieties, amaurosis is generally a symptom.

The acute hydrocephalus of infants is a disease which the oculist is seldom called upon to treat, as other serious symptoms generally precede the loss of sight. Strabismus, however, is not unfrequently the earliest sign of acute hydrocephalus; and occasionally it happens that loss of sight is the first symptom which creates alarm. Dr Graves mentions[61] his being called to visit a patient, whom he found to be a fine boy, walking about in apparently good health, but quite blind. Here amaurosis was the first symptom; others followed; and the child died in a convulsive fit about a fortnight afterwards.

Frequent and severe headachs have generally been troublesome during a number of years, before an adult is seized with acute hydrocephalus; at last, one of the usual attacks is attended by signs of pressure on the brain, delirium, perversion of language, dilated insensible pupils, and blindness; coma follows, and death.

Depletion, mercurialization, and counter-irritation are the means of cure to be followed in adults.

In children, the disease is often connected with a scrofulous constitution, and the general health too much impaired to allow of exhausting remedies. If there is pain, throbbing, and heat in the head, with other signs of plethora or congestion, leeches are to be applied; the scalp is to be kept wet with a cold lotion; and the child is to be purged. Frequent small doses of the sulphate of quina should then be given, if the child is of a feeble constitution. If the disease has followed the suppression of any eruption, counter-irritation behind the ears, or on the nape of the neck, is to be employed.

Water in the ventricles is often congenital. In this case, as the child grows, the cranium enlarges to an unnatural size, the mental and sensorial faculties are more or less impaired, and life is rarely prolonged beyond a few years. Amaurosis, with chronic enlargement of the head, the ventricles being distended with water, is a common occurrence. Counter-irritation of the scalp, and tonics internally, are sometimes useful.

§ 22. *Amaurosis from inflammation and dropsy of the brain, consequent to scarlatina.*

This is one of the most remarkable of the hydrocephalic amauroses.

It is no uncommon thing for a child, recovering from scarlatina, to be seized, perhaps after some exposure to cold, with headach, followed by frightful dreams, convulsions, blindness, and coma. These symptoms may have been preceded by the œdema which frequently supervenes upon scarlatina, and, on that account, are apt to be ascribed to sudden effusion in the brain; but the opinion of Dr Abercrombie is, I think, undoubtedly correct, that the disease is inflammatory, and that the patient can be saved only by the most vigorous antiphlogistic treatment—blood-letting, purgatives, and the like. Upon this plan, many cases perfectly recover; some remain ever afterwards liable to epilepsy; others die, and present the usual appearances of inflammatory affections of the brain.

Case 323.—A girl, eight years old, on the morning of the third day of the dropsical disease consequent to scarlatina, complained of headach, which in the course of the same day became extremely violent. In the evening, she was seized with convulsions, which, according to the report of her mother, continued 19 hours, with scarcely any intermission. They then ceased, but returned in two hours. In this interval it was discovered that she was blind, and that her pupils were much dilated. The convulsions, after they returned, continued 36 hours; and the patient remained blind eight hours after they left her. This child recovered. Her swellings, which were confined to the face and hands, disappeared while the convulsions were present, but returned after they had ceased.[62]

Case 324.—A boy, 13 years of age, on the morning of the seventh day after his face had begun to swell, was seized with headach; in the evening his limbs were convulsed, and his sight was almost entirely lost. His memory, however, and the faculties of his mind, seemed unimpaired. His convulsions ceased after half an hour; but they returned in an hour, and lasted again about half an hour. In this way he was alternately attacked, and relieved, 11 times in 20 hours. During the convulsions, the external swellings left him, and he complained much

of a pain in his belly, increased by pressure. When the convulsions had ceased altogether, his sight became less imperfect; but his countenance was pale, and his pulse feeble and very frequent. The following morning he died.[63]

§ 23. *Amaurosis from morbid formations in the brain.*

The diseases here referred to are tumours, formed by thickening of the interior membranes of the brain, or by deposition of new matter between their laminæ, or on their surfaces; also tubercles, hydatids or cysts, and fungous growths. The reader will find a good account of the symptoms arising from these various states of disease, in Dr Abercrombie's Pathological and Practical Researches on Diseases of the Brain. He states, however, that the symptoms are not sufficiently uniform, to enable us to refer them particularly to the several morbid affections in question. Their principal modifications he brings under seven heads; *viz.* 1. Long-continued and severe headach, without any other remarkable symptom. 2. After some continuance of fixed headach, affections of the senses, speech, and intellect. 3. Headach, affections of the senses, and convulsions. 4. Convulsions, without any affection of the senses. 5. Paralysis. 6. Prominent symptoms in the digestive organs. 7. Vertigo, and apoplectic attacks. The cases with which Dr Abercrombie has illustrated these classes of symptoms are highly interesting. It must not, however, be supposed that these classes of symptoms are at all times distinct, and never mix in one and the same case. That much remains to be done in regard to the pathology of morbid formations in the brain, is evident from the fact stated by Dr Abercrombie, that tumours are sometimes met with in that organ, which have produced no remarkable symptoms, while in other subjects, tumours in the same situation, and of no larger size, have been accompanied by blindness, convulsions, or paralysis.

Beer tells us, that the amaurosis resulting from morbid formations in the brain, generally attacks both eyes at once. The blindness is developed very slowly, not with the sensation of a black cloud, but with visus defiguratus, indistinctness and confusion in the appearance of all objects. Along with these symptoms there are repeated attacks of giddiness, distressing photopsia, and intolerance of light. The pupil for a time, is contracted; the blood-vessels on the surface of the eye turgescent; the motions of the eye and eyelids at first convulsive, but afterwards palsied, so that the eye is turned immovably to one side, and the upper eyelid cannot be raised. The pupil now becomes dilated, and vision extinguished. The headach generally goes on increasing, and pain is also felt in the vertebral column. The pain is not uniform in degree, but remits at times, and then increases with such violence that the patient almost loses his reason. There takes place, at last, a permanent disorder both of the remaining external senses and of the mental faculties. Hearing is the first of the remaining external senses which fails; then follows smell or taste, and sometimes both about the same time. At last, the patient loses his memory, and sinks

into general insensibility, or becomes maniacal. Hydrocephalus, and an attack of palsy, generally close the scene.

Causes. Morbid formations in the brain rarely occur except in persons of cachectic constitution. Their exciting causes are blows on the head, fatigue, anxiety, cold, and the like.

Treatment. In regard to the treatment of amaurosis, attended with symptoms leading us to suspect the existence of some morbid formation in the brain, it is important to observe, that such cases ought by no means to be considered as utterly hopeless. Many cases of this kind have their origin in inflammatory action; and, by proper treatment, we may often impede their progress, prolong the life of the patient, render him more comfortable, and even preserve a certain degree of vision. The treatment will consist in keeping the system low by evacuations and spare diet, in the cautious use of alteratives, cold applications to the head, issues or setons in the neck, and the careful avoidance of all causes of excitement.

Case 325.—Elizabeth Lindup, 19 years of age, of robust make, and general good health, had continued for three years to complain of pain and swimming of her head, increased by motion, and particularly by stooping. These symptoms continued with occasional exacerbations, accompanied by irritation of the stomach, and a suffusion of the eyes such as is produced by crying, till the 22d of April 1810; when, during her occupation of cooking a dinner she was seized without any previous warning, with a fit, during which she had no convulsions, but lay motionless, her inspirations being very long and deep, and gradually becoming less so till she recovered. This happened immediately after the completion of the menstrual flux, and lasted some minutes. Mr Morrah saw her before the fit was quite over, and was particularly struck with the complaint she made of an acute fixed pain of the head, and with the ferrety appearance of the eyes. One month from this time, she had another fit, which seized her so unexpectedly, that she dropped with a pan of milk in her hand; and from this time, till the 20th of August, she had a paroxysm every third week. Each of these paroxysms might be said to consist of two fits, one in the evening, from which she very imperfectly recovered, till after a second, next morning, after which she continued free from any fit for three weeks. On the 20th of August, she had three fits in one day, accompanied by a considerable derangement of stomach, and by screaming, and other indications of great suffering, amounting almost to delirium. A succession of these distressing attacks, increasing in severity, and with stupor intervening, continued till the middle of September, when she had nearly lost her hearing. Shortly afterwards she lost the sight of her right eye, and in 14 days more, that of her left. Her smell was completely gone, the olfactory nerves being insensible even to the stimulus of hartshorn; her speech and power of deglutition were very much impaired, and her left side, of which she had previously complained as being affected with rigors, became paralytic. On Friday the 7th of December, she fell into an apoplectic stupor, which continued till the Thursday morning following; during which period she neither spoke, nor took nourishment. At that time she roused up, spoke, and swallowed some refreshment, but soon relapsed into the former state; and on Friday evening, the 14th of December, she died. During the whole period, with the exception of October, she menstruated regularly. The pulse, till towards the conclusion, was not affected: there was no increase of heat, the bowels were rather costive, but easily acted upon; and the bladder did its office. At all times, however, the girl laboured under a degree of nervous irritability, unaccountable in a person of such general good health and robust organization.

On dissection, the vessels of the dura mater appeared rather more turgid than usual. On removing the dura mater, the pia mater was seen elevated over the right hemisphere by a tumour, which was found to be a hydatid or cyst, about three inches long by two inches broad, imbedded in the substance of the brain,

from which it was liberally supplied with numerous minute blood-vessels. The left ventricle contained a little more fluid than is usually found in a healthy subject; the right had hardly any, being compressed by the tumour.[64]

Case 326.—Miss M. A. was afflicted with severe headach in the early part of 1820, being then in her 17th year. She was of a delicate frame, light hair and eyes, fair complexion, and mild and cheerful disposition. She had previously enjoyed good health, menstruated regularly, had not received any blow or injury, and knew of no cause to which her complaint could be assigned. Common means afforded relief, and she went down into Cheshire for four months during the summer, where she was in the habit of taking daily exercise, and on one occasion walked 10 miles without much inconvenience, but was never entirely free from headach. Shortly after her return to town the pain became very distressing, and she again derived benefit from medicines, and the application of a blister to the neck. In January 1821, in consequence of a severe return of pain, leeches were applied to the forehead, after which she had a long interval of comparative ease. In February, she was at a ball, danced for several hours, and appeared to enjoy herself much; nor did she apply for farther advice till the 30th of May following. Her symptoms then became rapidly worse, and the pain of the head assumed a more serious character. It was usually referred to the right temple, and she experienced a regular exacerbation every morning, to such a degree, that in agony, she would roll about the bed for an hour or two, after which the pain would gradually subside, and continue tolerable during the day. She was affected with vertigo, occasional syncope, great dread of imaginary objects, a state of high nervous irritation, dulness of hearing, and indistinct vision. She became short-sighted; objects appeared to her larger than natural, and at times she was totally blind for several seconds. She had quickness of pulse, heat of skin, violent pain in the stomach, sickness and vomiting. Severe pains, unattended with any external appearance of inflammation, attacked in succession various parts of the body; at one time the throat, occasioning an extreme difficulty of deglutition, at another the chest, impeding the respiration, at another different parts of the spine, particularly towards the neck, also the knees, the ancles, and the wrists. Blisters, cold applications to the head, mercury in small doses, not to the extent of salivation, and various other means were tried, but with little or no relief. Her health declined fast, and she became much emaciated from the constant vomiting.

On the 31st of August 1821, she was attacked, while in bed, with a fit of strong convulsions, attended with strabismus and screaming, which lasted about half an hour, and left her in a state of stupor. Next day she had lost all power over the body, and could not raise herself, or even turn from side to side in bed; her legs and arms she could still move a little; her sight, which, though imperfect, had hitherto enabled her to discern objects, was now so far lost, that she could perceive only the difference between light and darkness. The pupils were much dilated, but still slightly affected by light. Her deafness also was greatly increased. The failure in sight and hearing occurred first on the left side, being opposite to that in which the pain was originally fixed. The bowels were obstinately costive; the vomiting and pain of stomach continued; the pain of the head was intense; the pulse quick, her respiration hurried, skin hot and dry, sleep tranquil and without stertor. In the course of a few days, she had a repetition of the same kind of fit; which continued to return with more or less frequency and severity, till within a short period of her death, generally influenced, however, by the state of the alimentary canal. Sometimes she had five or six in a day, and occasionally she would pass several days without any fit. They usually came on without warning; sometimes they appeared to be produced by slight exertion. Besides the general convulsive attacks, she was subject to spasmodic twitchings and startings of different parts of the body. Sight and hearing were soon lost altogether; smell was also entirely lost, and taste, if any remained, was very imperfect. She expressed a desire for particular articles of food, but always complained of their being insipid, and could seldom tell what she was eating.

Being deprived of the use of all the organs of sense, except touch, the only mode of communication that could be devised was the common method of talking

with the fingers, the person with whom she was conversing indicating each letter upon her fingers. She was soon able to distinguish by the touch every person with whom she was in the habit of talking, and acquired considerable facility in this mode of conversing, guessing the words before they were half spelled. She would thus keep one or other of her attendants constantly employed when awake. She was anxious to amuse herself with some kind of manual occupation, but her arms were so feeble that she could not bear the fatigue. Her intellect was unimpaired, except when under the influence of the fits. She appeared to be aware of her hopeless condition, and desired that her head might be opened after death. She evinced great patience under her sufferings, and was even cheerful when the pain was moderate. She was seldom, however, when awake, free from intense pain in the head, of a lancinating or throbbing kind, not confined to any particular part. The pain at the upper and lower part of the spine, the sensation of extreme coldness down the back, and the pain in the right, and afterwards in the left breast, were also at times exceedingly distressing. The face was often swelled, and at other times quite shrunk. She rarely complained of cold, excepting down the spine. The cheeks were subject to partial flushings, the heat of skin was frequently oppressive, and the itching at times intolerable. The tongue was occasionally furred, but generally clean. She had no thirst. The appetite, after the vomiting ceased, became almost insatiable, and she recovered flesh. The eyes retained their lustre, but were quite insensible to light, and the pupils were fully dilated.

Subsequently she had repeated attacks of bilious vomiting, reducing her each time to a state of extreme debility, from which she as often rallied in a surprising manner. The bowels were obstinately torpid, seldom acting without the aid of cathartics. She once went 14 days without an evacuation. Her symptoms were invariably aggravated when the bowels were constipated. The catamenia ceased to appear, after she was confined to bed. Her respiration was natural and easy; speech unaltered; voice clear and distinct; pulse from 80 to 100, small and generally weak; sleep very easy and undisturbed, except by her crying out to be turned, after which she would fall asleep again directly. She could lie on her back, or on either side, but was unable to rest in the same position above half an hour at a time, so that she required some person constantly in attendance to turn her; and if this was not done, as soon as asked for, she often went into a fit. She never recovered the power of her body, nor could she move her head in the least degree; but her sense of touch continued perfect. Several attempts were made to raise her gradually in bed, but they always produced considerable pain, and, if persisted in, brought on a fit. The medicines exhibited were intended merely to relieve her sufferings, except an attempt which was made to affect the system with mercury; but the fits increased so much during its use, that it was discontinued.

The above symptoms continued with more or less urgency till February 1823, when her powers began to fail altogether, the stomach rejecting every kind of food. No evacuation could be procured from the bowels, without the aid of injections; the whole muscular system seemed to lose its tone; the limbs were drawn into a semiflexed position, and she had scarcely strength to move them; the lips were half closed, the mouth full of aphthous ulcerations, and the teeth covered with sordes; the features were distorted; she slept with her eyelids half open: the eyes became dim; inflammation came on in the left eye, which proceeded to ulceration, and opacity of the cornea. She expressed no pain, and was not even aware that the eye was affected. The urine and fæces were passed involuntarily. She could not swallow any food unless it was reduced to a liquid form, and then only with difficulty. She had a troublesome cough, which, from her extreme debility, frequently threatened suffocation. Pain in the head continued to distress her, but the fits were less frequent, and appeared incapable of producing the same convulsive action, from want of power in the muscles. Her mental faculties also declined; she talked very little, and only of her complaints. Her pulse was so feeble as to be scarcely perceptible. She still breathed freely, and slept much. In September, a slight diarrhœa came on. She could now take scarcely any sustenance, and had become so much emaciated that the skin was excoriated in several places from pressure. She died on the 5th October 1823,

having lingered more than two years from the first attack of convulsions, and nearly four years from the commencement of the headach.

The scalp was slightly œdematous. The bones of the cranium were extraordinarily thin, and several short spiculæ projected inwards, from the posterior part of each parietal bone. The membranes covering the brain were free from disease; the substance of the cerebrum rather softer than usual; from eight to ten ounces of fluid in the ventricles; the membrane lining the ventricles of a dingy yellow colour. The thalami nervorum opticorum were somewhat enlarged, and entirely converted into a fungous disease, (*Fig.* 110.) which Mr Hunter, the narrator of the case, considers to have been of the nature of fungus hæmatodes. A longitudinal section through one of the thalami presented exactly the appearance of a portion of coagulated blood. The corpora striata were not affected, but the disease extended into the adjacent parts of the cerebrum and cerebellum below, and also to the lower and posterior edge of the falx major. The optic nerves were of a darker colour than usual, but did not appear to be altered in texture. The other cerebral nerves presented no deviation from their natural structure. The spinal marrow, as far as could be traced through the foramen magnum, was perfectly healthy. There were several sharp ridges of bone at the basis of the cranium, and the irregularities were all very strongly marked. No diseased appearance was found in the thorax nor abdomen, except a number of small biliary concretions.[65]

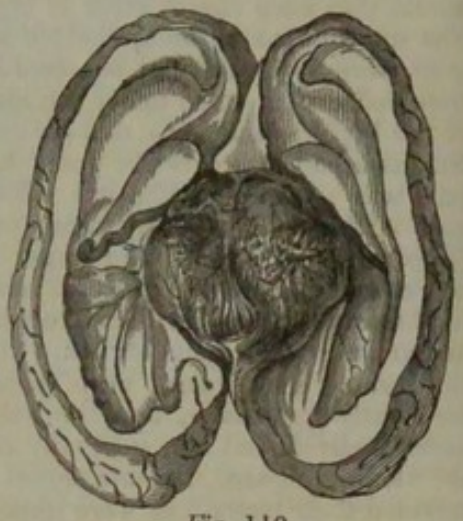

Fig. 110.

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[1] Langenbeck, De Retina Observationes Anatomico-pathologicæ, p. 148; Gottingæ, 1836.

[2] Dictionaire des Sciences Médicales, Tome xxxv. p. 20; Paris, 1819.

[3] Angiectasie, p. 32; Leipzig, 1808.

[4] Morbid Anatomy of the Human Eye, Vol. ii. Pl. xv. fig. 1; London, 1818.

[5] Notes to Weller's Manual, Vol. ii. p. 79; Glasgow, 1821.

[6] On Injuries of the Brain, in the 14th volume of the Medico-Chirurgical Transactions.

[7] Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. iii. p. 122; London, 1812.

[8] Ibid. p. 115.

[9] Pathological and Practical Researches on Diseases of the Brain, p. 461; Edinburgh, 1829.

[10] Cruveilhier, Anatomie Pathologique du Corps Humain, 8ième Livraison, Pl. 3. fig. 1 and 2; Paris, 1830.

[11] Bright, in Guy's Hospital Reports, Vol. i. p. 9; London, 1836.

[12] De Morbis Oculorum, p. 75; Gottingæ, 1746.

[13] Commentaries on Insanity, p. 120; London, 1828.

[14] See case reported by I. J. Ikin, Lancet, January 9, 1836, p. 569.

[15] Medical Facts and Observations, Vol. v. p. 97; London, 1794.

[16] Stevenson on Amaurosis, p. iv; London, 1821.

[17] Dublin Journal of Medical Science, Vol. ix. p. 107; Dublin, 1836.

[18] Farre's Life of Saunders, prefixed to a Treatise on some practical points relating to the Diseases of the Eye, p. xix; London, 1811.

[19] Lee on the Diseases of Women, p. 169; London, 1832.

[20] Op. Cit. p. 309.

[21] Observations on the Cataract and Gutta Serena, p. 400; London, 1812.

[22] London Medical Repository for June 1825, page 443. See case by Stilling, in Ammon's Zeitschrift für die Ophthalmologie, Vol. iii. p. 465; Dresden, 1833.

[23] Ward, London Medical Repository, Vol. xx. p. 217; London, 1823. See

Powell, Medical Transactions, Vol. v. p. 223; London, 1815. Rayer, Archives Générales de Médecine, Tome iii. p. 350; Paris, 1823.

[24] Journal de Physiologie, Tome viii. p. 28; Paris, 1828.

[25] Practical Observations in Surgery and Morbid Anatomy, by John Howship; p. 121; London. 1816.

[26] Ibid; p. 119.

[27] Larrey, Recueil de Mémoires de Chirurgie, p. 227; Paris, 1821.

[28] Collections from the Unpublished Medical Writings of C. H. Parry, M.D; Vol. i. p. 561; London, 1825.

[29] Travers' Synopsis of the Diseases of the Eye, p. 166; London, 1820.

[30] Ibid; p. 164.

[31] Allan's System of Surgery, Vol. iii. p. 187; Edinburgh, 1824.

[32] Traité sur les Vers Intestinaux, traduit par Grundler, p. 370; Paris, 1824.

[33] Revue Medicale, Tome iv. p. 435; Paris, 1832.

[34] Edinburgh Medical and Surgical Journal, Vol. xxvi. p. 279; Edinburgh, 1826.

[35] Abercrombie, Op. Cit. p. 143.

[36] Osiander's Nachrichten von Wien, p. 76; Tübingen, 1817.

[37] Mémoires de Chirurgie, par J. N. Arrachart; p. 201; Paris, 1805.

[38] Howship, Op. Cit. p. 135.

[39] Fatal Effects of an Over-dose of Stramonium, by E. W. Duffin; London Medical Gazette, Vol. xv. p. 194.

[40] Ogston, Edinburgh Medical and Surgical Journal, Vol. xl. p. 277.

[41] Pharmacologia, Vol. ii. p. 451; London, 1825.

[42] Duplay, Archives Générales de Médecine, ii[e] Série, Tome v. p. 5; Paris, 1834.

[43] Case of the Effects of Tobacco, by Marshall Hall, M.D. in Edinburgh Medical and Surgical Journal, Vol. xii. p. 11; Edinburgh, 1816.

[44] Zeitschrift für Physiologie, Vol. i. p. 271; Heidelberg, 1824.

[45] Trattato delle principali Malattie degli Occhi, Vol. ii. p. 281; Pavia, 1816.

[46] Lancet, 3d November 1838, p. 228.

[47] Abernethy's Surgical Observations on the Constitutional Origin and Treatment of Local Diseases, p. 91; London, 1809.

[48] Such paroxysms, as are here described by Mr Lessey, are generally regarded as hysterical. In a female, who had long been subject to such fits, I found, on dissection, the heart of a remarkably small size. She had been bled exceedingly often in the course of five or six years preceding her death, and perhaps to this circumstance the smallness of the heart might be owing.

[49] Edinburgh Medical and Surgical Journal, Vol. xxv. p. 319; Edinburgh, 1826.

[50] London Medical Gazette, Vol. xxiii. p. 428.

[51] Des Pertes Séminales Involontaries; Paris, 1836.

[52] Edinburgh Medical and Surgical Journal, Vol. xliii. p. 338.

[53] Arrachart, Op. Cit. 209.

[54] Caffe, Résumé du Compte-rendu de la Clinique Ophthalmologique de l' Hôtel-Dieu, p. 9; Paris, 1837.

[55] Travers' Synopsis of the Diseases of the Eye, p. 145; London, 1820.

[56] Ibid.

[57] London Medical and Surgical Journal, November 3, 1832, p. 431.

[58] Ware's Observations on the Cataract and Gutta Serena, p. 385; London, 1812.

[59] Howship, Op. Cit. p. 1.

[60] Archives Générales de Médecine, Tome xxiii. p. 261; Paris, 1830.

[61] London Medical Gazette, Vol. xix. p. 811.

[62] Observations on the Dropsy, which succeeds Scarlet Fever, by William Charles Wells, M.D. in the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. iii. p. 177; London, 1812.

[63] Ibid. p. 178.

[64] Medico-Chirurgical Transactions, Vol. ii. 262; London, 1823.

[65] Ibid, Vol. xiii. p. 88; London, 1825. See case of tumour pressing on the right crus cerebri, right half of pons Varolii, and anterior surface of the right lobe

of the cerebellum, producing amblyopia of right eye, and complete amaurosis of left; by Boyer, Archives Générales de Médecine, iie Série, Tome viii. p. 91. Case of hydatids in the left lateral ventricle, producing distressing photopsia, and complete amaurosis; by Johnson, Medico-Chirurgical Review, January 1836, p. 202. Case of tumour pressing on corpora quadrigemina; by Kennion, London Medical Gazette, Vol. xxii. p. 894. Case of tumour in third ventricle, Monro's Morbid Anatomy of the Brain, Vol. i. p. 167; Edinburgh, 1827.

CHAPTER XXV.

ENTOZOA IN THE ORGAN OF VISION.

Portal[1] tells us, that he found hydatids between the choroid and the retina. From so meagre a statement, it is impossible to determine the kind of entozoon which he saw; indeed it is doubtful whether what he calls *hydatids* were entozoa or not.

The following are the entozoa which have been met with in the human organ of vision:—

1. *Echinococcus hominis*, in the cellular substance of the orbit. 2. *Cysticercus cellulosæ*, in the cellular substance of the eyelids, under the conjunctiva, and in the anterior chamber. 3. *Filaria Medinensis*, under the conjunctiva. 4. *Filaria oculi humani*, in the crystalline. 5. *Monostoma oculi humani*, in the crystalline. 6. *Distoma oculi humani*, in the crystalline.

§ 1. *Echinococcus hominis.*

The term *hydatid*, which, correctly used, comprehends two or more genera of entozoa, has often been misapplied to common encysted tumours. In the following case, however, it would appear that a number of echinococci were contained in the cellular substance of the orbit.

Case 327.—Charles Rowell, aged 42, was admitted into the London Ophthalmic Infirmary, under the care of Mr Lawrence, on the 3d January 1820, with protrusion of the globe from the orbit by a deep-seated tumour, which had been growing for seven years. He had applied at the Infirmary at an earlier period, when the unnatural prominence of the eyeball was distinctly marked, but vision had not become impaired. Mr L. at that time, felt obscurely, under the superciliary arch, a small, firm protuberance, which seemed part of a deep-seated swelling, and considered extirpation as affording the only chance of relief. The patient was averse to this, and discontinued his attendance. The complaint had slowly increased, its progress having been attended with great pain, which, for some months, had been so severe, both day and night, as to cause great emaciation and general weakness.

When this patient was admitted into the Infirmary, the tumour had advanced so far between the upper-inner portion of the eyeball and the eyelid as to thrust the globe completely out of the orbit. The upper lid, greatly stretched and inflamed, covered the eye and the tumour; the lower was completely everted, and its mem-

branous lining appeared as a thick fleshy mass. The conjunctiva of the globe was thickened by chronic inflammation, the consequence of exposure. The structure of the eye was uninjured; the pupil of a middle size, circular, and motionless; vision was destroyed. The tumour was firm, and apparently fixed to the orbit, affording, on pressure, an obscure sense of fluctuation.

To relieve the distension and pain, and acquire some farther insight into the nature of the disease, a puncture was made into the most prominent part of the swelling, when about a dessert-spoonful of clear watery fluid escaped. Considerable diminution of suffering ensued. When Mr Lawrence examined the part two days after, he found a soft white substance in the puncture, which, on being removed with a pair of forceps, proved a hydatid. A few others escaped when pressure was made on the swelling. Some more were evacuated next day, and Mr L. afterwards cleared out the whole collection, amounting to half a tea-cupful, by enlarging the puncture, and injecting water forcibly into the cavity. The hydatids varied in size, from that of a filbert to that of a small pea. Some were entire, others collapsed. Inflammation and suppuration of the cyst followed, without much pain; the discharge then gradually diminished, and the opening closed in about a month. The eye returned to its natural situation, and all uneasiness ceased. In March, the only traces of the complaint were a loose and wrinkled state of the integuments of the upper lid, and the eversion of the lower, which was gradually diminishing by the application of lunar caustic to the thickened conjunctiva. A little motion of the iris, and slight perception of light, had returned.[2]

§ 2. *Cysticercus cellulosæ.*

Case 328.—A lad of 14 years of age was brought to me for consultation, with a considerable elevation of the soft parts in the left temple, and dilatation of the zygoma. When one finger was placed within the mouth, and pressure was made with another finger externally, the swelling was perceived to fluctuate obscurely. The antrum was sound. I advised a puncture to be made into the swelling within the mouth. This gave issue to a great number of hydatids, mixed with glairy fluid. Gradually the swelling fell, and also the dilated zygoma. By and by, the left upper eyelid, became swoln and red. In fact it suppurated, and on being opened with the lancet, a quantity of pus was discharged, with six or eight cysticerci cellulosæ, about the size of small peas. After this, the young man perfectly recovered.

Case 329.—A little girl, of six years of age, was brought to the Bristol Eye Dispensary, with a vesicular tumour, about the size of a pea, beneath the conjunctiva scleroticæ of the right eye, and so near to the inner canthus, that it was entirely concealed from view, except when the eye was turned outwards. It was accompanied by no inflammation, nor productive of any inconvenience. Neither mother nor child knew how long it had existed.

Mr Estlin opened the tumour with a cataract-knife, and a thin serous fluid escaping, the distended conjunctiva immediately became flaccid. Besides the clear fluid which was let out, Mr Estlin observed a white flat substance, which he supposed to be a flake of coagulable lymph, or some caseous matter which the tumour had contained; it was, however, of a firm membranous character. On being immersed in water, it expanded, and was seen to be a little bag, which had been opened, and which had attached to it a white, rather solid body, a line and a half in length, and half a line in breadth. The bag itself might be compared, in point of size, with the skin of a very small currant. The more solid portion appeared within the cavity of the bag.

On examining the substance with a lens of an inch focus, it was obvious that it was the cyst of a hydatid, the projecting part being the head and neck of a cysticercus telæ cellulosæ. While viewed in water, the four suctorious discs were observable at the extremity of the head, and when gently compressed between the glasses of an aquatic box, and a higher power employed, the double circle of hooks was also seen. The rugæ in the neck were very conspicuous. The head and neck were covered with minute oval bodies, probably gemmules. On the head they were not very numerous, but the neck was studded with them;

they were not only upon the surface, but within the substance of the neck and head. The size of these gemmules was about $\frac{1}{1500}$dth of an inch. Not one was to be seen in the cystic part of the entozoon. The thick neck, covered with these minute oval bodies, was strongly contrasted with the fine smooth membrane forming the globular part of the entozoon.[3]

Three instances of a cysticercus cellulosæ in the anterior chamber have been recorded; the first by Neumann, the second by Dr W. Soemmerring, and the third by Mr Logan, of New Lanark.

Case 330.—Neumann's case occurred in a scrofulous boy of 14 years of age. The cysticercus, as it lay in the anterior chamber, measured 2½ lines in its long diameter, and seemed to be more than a line in thickness. It was moveable, and did not impede vision. At first, it was supposed to be the lens, fallen into the anterior chamber. The pupil being dilated by belladonna, the cysticercus slipped into the pupil, and remaining there, caused severe pain. The strongest solution of belladonna proved insufficient to free the cysticercus from the embrace of the pupil; next day, therefore, a needle was passed through the cornea, and the cysticercus couched, by which means the pupil was freed, and the pain removed; but on the third day, severe inflammation set in, and the eyeball suppurated.[4]

Case 331.—In Dr W. Soemmerring's case, there was a living cysticercus in the left anterior chamber of a healthy girl of 18 years of age. It first appeared soon after an ophthalmia, looked like a little bit of semi-opaque skin, and gradually increased in size. Two months after its first appearance, it caused no pain, but only a slightly disagreeable feeling when it moved briskly; it impeded vision, only when it came directly before the pupil; there was a slight redness round the edge of the cornea. The cysticercus generally lay, like a partially dissolved lenticular cataract, at the bottom of the anterior chamber. It appeared as a transparent sphere, presenting only at one spot a milk-white, opaque projection. When the eyelids were gently rubbed, and sometimes spontaneously, the opaque wrinkled portion of the sphere became protuberant, and the slender, filiform neck was slowly pushed out. The vesicular body of the hydatid changed, sometimes slowly, sometimes quickly, its spherical form, into one which was broader, oval, or pear-shaped. It commonly lay at the distance of from half a line to a line from the lower edge of the cornea, as the angle between the iris and the cornea was too narrow to contain it. The neck hung down most frequently like a plummet, and swung freely towards every part of the circumference of the cornea, according as the patient's head was moved; seldom did it appear to take hold of any thing.

After remaining for seven months in the eye, and during the last five months acquiring double its previous size, so that it was as large as a pea, a small incision into the cornea was made by Dr Schott, and the hydatid extracted alive, with a pair of hooked forceps. Being put into lukewarm water, it continued to move for more than half an hour. It then became gradually opaque and white, and, with the microscope, the four prominent suckers surrounding the double circle of hooks, and forming the head of the animal, were plainly discerned.[5]

To the kindness of Mr Meikle, of Edinburgh, I owed the opportunity of examining the case of cysticercus in the anterior chamber, which occurred in the practice of Mr Logan, and of which he had previously published an account.[6] The patient, a lively, healthy girl, of seven years of age, was present at the Glasgow Eye Infirmary, on the 3d April 1833, and the accuracy of Mr Logan's account of the case fully recognised by a great number of medical practitioners.

Case 332.—From the month of August 1832, till about the middle of January 1833, when she was first brought to Mr Logan, the child had suffered repeated attacks of inflammation in the left eye. Mr L. found the cornea so nebulous, and the ophthalmia so severe, that he dreaded a total loss of sight. He treated the case as one of scrofulous ophthalmia; and after the use of alterative medicines, and the application of a blister behind the ear, the inflammatory symptoms sub-

sided, leaving, however, a slight opacity of the lower part of the cornea. After a week, the child was again brought to Mr L. who, on examining the eye, discovered, to his great surprise, a semi-transparent body, of about two lines in diameter, floating unattached in the anterior chamber. This body appeared almost perfectly spherical, except that there proceeded from its lower edge a slender process, of a white colour, with a slightly bulbous extremity, not unlike the proboscis of a common fly. This process, Mr L. observed to be of greater specific gravity than the spherical or cystic portion, so that it always turned into the most depending position. He also remarked that it was projected or elongated from time to time, and again retracted, so as to be completely hid within the cystic portion, while this, in its turn, assumed various changes of form, explicable only on the supposition of the whole constituting a living hydatid.

On the 3d April, when I examined the case, I found the cornea slightly nebulous, the eye free from inflammation and pain, and the appearances and movements of the animal exactly such as described by Mr Logan.

When the patient kept her head at rest, as she sat before me, in a moderate light, the animal covered the two lower thirds of the pupil. Watching it carefully, its cystic portion was seen to become more or less spherical, and then to assume a flattened form, while at one moment I saw it thrust its head suddenly down to the bottom of the anterior chamber, (*Fig.* 111.) and at the next draw it

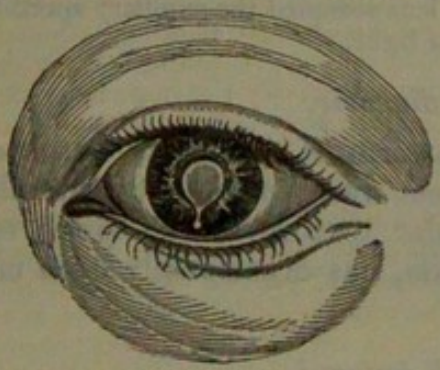

Fig. 111.

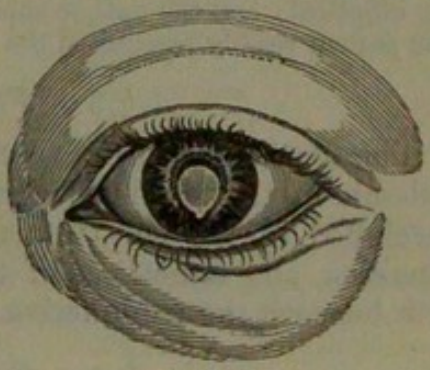

Fig. 112.

up so completely that it was scarcely visible, (*Fig.* 112.) Mr Meikle turned the child's head gently back, and instantly the hydatid revolved through the aqueous humour, so that the head fell to the upper edge of the cornea, now become the more depending part. On the child again leaning forwards, it settled like a little balloon in its former position, preventing the patient from seeing objects directly before her, or below the level of the eye, but permitting the vision of such as were placed above.

Mr Logan had observed no increase of size in the animal while it was under his inspection. Mr Meikle had watched it carefully for three weeks, without observing any other change than a slight increase in the opacity of the cystic portion.

To every one who had seen or heard of Mr Logan's case, the question naturally occurred, Ought not this animal to be removed from the eye? Mr Logan and Mr Meikle appeared to have deferred employing any means for destroying or removing it; first, because it seemed to be producing no mischief; and, secondly, because there was a probability that it was a short-lived animal, and likely, therefore, speedily to perish, and shrink away, so as to give no greater irritation than a shred of lenticular capsule. Various means naturally suggested themselves for killing the animal; such as passing electric or galvanic shocks through the eye, rubbing in oil of turpentine round the orbital region, giving this medicine internally in small doses, or putting the child on a course of sulphate of quina, or of some other vegetable bitter known to be inimical to the life of the entozoa. As the patient appeared to be in perfect health, it was natural to suppose that the other organs were free from hydatids, and that the change of diet would have little or no effect upon the solitary individual in the aqueous humour. Had she, on the contrary, presented a cachectic constitution, with pale complexion, tumid belly, debility, and fever, none of which symptoms were present, we should have been

led to suspect that what was visible in the eye was but a sample of innumerable hydatids in the internal parts of the body, and might have recommended a change of diet, with some hopes of success.

In the course of six weeks after I saw the patient, the cysticercus having enlarged in size, the vessels of the conjunctiva and sclerotica become turgid, the iris changed in colour, and less free in its motions, while the child complained much of pain in the eye, it was decided that the hydatid should be extracted, and I owe to Dr Robertson, of Edinburgh, who operated, the communication of the following particulars.

The incision of the cornea was performed without the slightest difficulty, but no persuasion or threats could induce the child again to open the eye; she became perfectly unruly, and the muscles compressed the eyeball so powerfully, that the lens was forced out, and the hydatid ruptured. The patient was put to bed in this state. In the evening, Dr R. succeeded in getting the girl to open the eyelids, when, with the forceps he extracted from the lips of the incision the remains of the animal in shreds, it being so delicate as scarcely to bear the slightest touch. A portion of the iris remained in the wound, which nothing would induce the girl to allow Dr R. to attempt to return.

After the eye healed, the cornea remained clear, except at the cicatrice, where it was only semi-transparent; the pupil, in consequence of adhesion to the cicatrice was elliptical; and the opaque capsule of the lens occupied the pupillary aperture. The patient readily recognised the presence of light.

§ 3. *Filaria Medinensis.*

The filaria Medinensis, or Guinea-worm, a species of entozoon endemic in the tropical regions of Asia and Africa, and generally developed in the sub-cutaneous cellular texture of the lower extremities, and sometimes of the scrotum, has occasionally been met with beneath the conjunctiva.[7]

§ 4. *Filaria oculi humani.*

The discovery of a species of filaria in the interior of the human eye, we owe to Dr Nordmann, of Odessa. On examining an opaque crystalline lens, extracted by Gräfe, and partially covered by its capsule, Dr N. detected in the Morgagnian fluid, two very small and delicate rings, which, with the aid of the microscope, he recognised as convoluted filariæ. One of the two had been wounded in the middle, probably by the instrument used for opening the capsule, so that the intestines protruded from the body, and appeared like fine threads. The other was uninjured, about three quarters of a line long, and extremely slender. It was spirally convoluted, and completely dead.[8]

In a lens extracted by Dr Jüngken, Dr Nordmann afterwards found a living filaria, five lines and a half long.

§ 5, 6. *Monostoma and Distoma oculi humani.*

In an extracted lens, Dr Nordmann detected eight minute individuals of the genus monostoma;[9] and Drs Gescheidt and Ammon, on another occasion, found four of the genus distoma.[10]

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[1] Cours d'Anatomie Médicale, Tome iv. p. 418; Paris, 1803.
[2] Medico-Chirurgical Transactions, Vol. xvii. p. 48; London, 1831.
[3] London Medical Gazette, Vol. xxii. p. 839.

[4] Quoted by Rosas, Lehre von den Augenkrankheiten, p. 430, Wien, 1834, from Rust's Magazin, Vol. xxxiii. p. 599.

[5] Isis, von Oken; 1830; Heft vii; p. 707. Schmalz, XIX. Tabulæ Anatomiam Entozoorum illustrantes, p. 11; Dresdæ, 1831.

[6] Case of Animalcule in the eye of a child; by Robert Logan; 1833.

[7] Mongin, Journal de Médecine de Paris, 1770, Tome xxxii. p. 338.

[8] Mikrographische Beiträge zur Naturgeschichte der wirbellosen Thiere; Heft i. p. 7; Berlin, 1832.

[9] Ibid; Heft ii. p. ix.

[10] Zeitschrift für die Ophthalmologie, Vol. iii. 75; Dresden, 1833. On Entozoa in the eyes of man and other animals, consult Gescheidt, in Ibid. p. 405.

ERRATA.

Page 126, line 22, *for* nervous, *read* venous.
— 164, — 32, — without, — partially.
— 351, — 6, — verging, — varying.
In some copies, page 493, lines 19 and 20, *for* 52 and 53, *read* 53 and 54.

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THE END.

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By the same Author.

A

SHORT DESCRIPTION

OF THE

HUMAN MUSCLES,

IN AN

ORDER OF DISSECTION

BY WHICH

THE WHOLE MAY BE EXAMINED UPON ONE SUBJECT;

TO WHICH IS ADDED

A TABLE

OF THE

COMBINED ACTIONS OF THE MUSCLES.

IN ONE VOLUME, 18MO.

R. B. 19.1.1979