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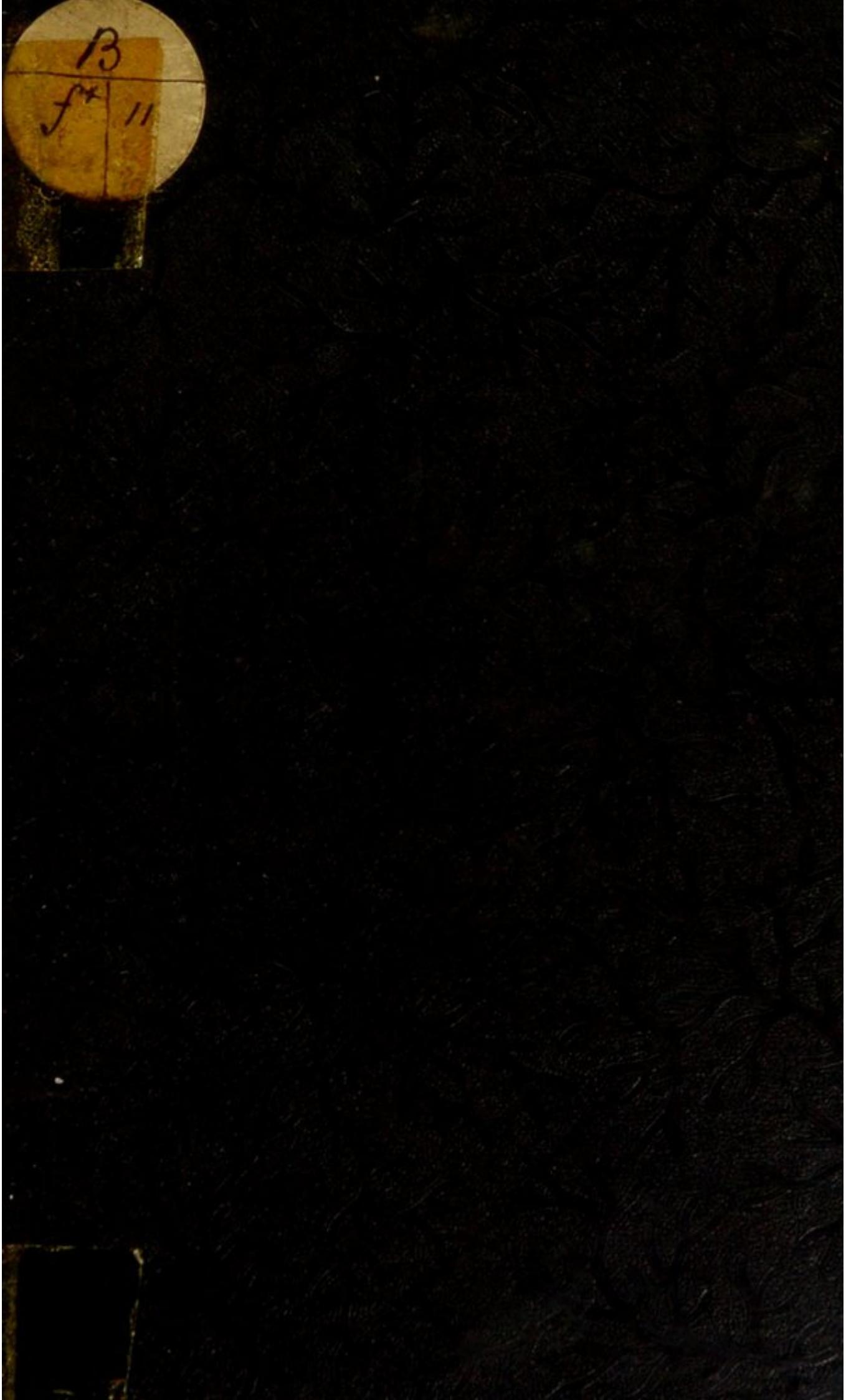
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PRINCIPLES

OF

OPHTHALMIC SURGERY.

LONDON:
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THE PRINCIPLES OF OPHTHALMIC SURGERY;

BEING AN INTRODUCTION TO

A KNOWLEDGE OF THE STRUCTURE, FUNCTIONS, AND DISEASES OF THE EYE;

EMBRACING NEW VIEWS OF

THE PHYSIOLOGY OF THE ORGAN OF VISION.

BY JOHN WALKER,

ASSISTANT SURGEON TO THE MANCHESTER EYE INSTITUTION,
AND AUTHOR OF
"AN ESSAY ON THE PHYSIOLOGY OF THE IRIS," &c.

LONDON:

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ADVERTISEMENT.

The object in the preparation of this work has been to condense, in a small compass, the chief points in the treatment of the diseases of the eye. It seemed likely to make it more complete, if a short account of the structure and functions of each portion of the organ were prefixed, a plan usually followed in treatises of this description. An explanation of the principal terms applied to this branch of surgery is also appended. The whole is the result of a combination of actual observation and experience, with some researches into the best writers on this subject; and it is hoped that it will be found to contain a correct view of the practice best adapted to the treatment of this important class of affections.

With respect to his views of the physiology of the eye, the author trusts that, as they have not been adopted by himself without looking at the subject in all its bearings, so they may not be rejected by others without due consideration.

Manchester,
Oct. 1834.

CONTENTS.

SECTION I.

THE PALPEBRÆ OR EYELIDS.

Page

Structure and Use 1

DISEASES.

Inflammation and Abscess 3
Œdema palpebrarum 4
Ophthalmia tarsi 4
Tinea tarsi 4
Lippitudo 5
Hordeolum 5
Chalazion 6
Milia 6
Carcinoma 6
Syphilitic ulceration 6
Ptosis 6
Shortening of the upper lid 7
Ectropium 8
Entropium 9
Trichiasis 10
Distichiasis 10
Tumors 11
Encanthis 11
Epicanthis 11
Nævi materni 11
Adhesions, &c. 12
Congenital deficiency 12

SECTION II.

THE TUNICA CONJUNCTIVA, OR ADNATA.

Page

Structure and Use 13

DISEASES.

Conjunctivitis 14
Catarrhal ophthalmia 17
Purulent ophthalmia 18
Gonorrhœal ophthalmia 28
Purulent ophthalmia in infants . . . 29
Strumous ophthalmia 30
Pustular ophthalmia 33
Erysipelatous ophthalmia 33
Variolous, &c. 34

CHRONIC DISEASES.

Pterygium 34
Granulations 35
Fungus 36
Xerosis 36
Ulcers 37
Chemosis, &c. 37

SECTION III.

THE GLOBE, OR EYEBALL.

Its Structure, Composition, and Use . . 37

DISEASES.

Ophthalmitis 53
Suppuration of the globe 54
Ophthalmitis interna 54
Ophthalmitis externa 55
Hydrophthalmia 55

Page

Varicose ophthalmia 56
Exophthalmia 56
Atrophia oculi 56

MALIGNANT DISEASES.

Cancer oculi 57
Melanosis oculi 58
Fungus hæmatodes 59
Extirpation of the globe 60

OTHER AFFECTIONS OF THE GLOBE.

Simple Fungus 61
Nyctalopia 62
Hemeralopia 63
Strabismus 64
Myopia 65
Presbyopia 66
Malformations 67

SECTION IV.

THE CORNEA.

Structure and Use 67

DISEASES.

Corneitis 69
Abscess of the cornea 71
Ulceration of the cornea 72
Opacity of the cornea 74
Vascular cornea 77
Staphyloma of the cornea 77
Partial staphyloma 80
Conical cornea 80
Fungous growths 81
Wounds 81
Malformation 82

SECTION V.

THE SCLEROTICA.

Page
Structure and Use 82

DISEASES.

Sclerotitis, or rheumatic ophthalmia . . 84
Catarrho-rheumatic ophthalmia . . . 86
Staphyloma scleroticæ 86
Wounds 87

SECTION VI.

THE CHOROID.

Structure and Use 88

DISEASES.

Choroiditis 90
Wounds, &c. 91

SECTION VII.

THE RETINA.

Structure and Use 91

DISEASES.

Retinitis, or active amaurosis . . . 94
Chronic amaurosis 97
Sympathetic amaurosis 101
Amaurosis from debility 102
Injuries of the retina 103

SECTION VIII.

THE IRIS.

Structure and Use 104

DISEASES.

Idiopathic iritis 116
Sub-acute and chronic iritis 119
Syphilitic iritis 120
Rheumatic and arthritic iritis . . . 121
Strumous iritis 121

Page
Closed pupil 122
Operation for artificial pupil . . . 123
Adams's operation 123
Cheselden, Wenzel, Janin, and Maunoir's operations 123
Beer, Gibson, Scarpa, and Schmidt's operations . 125
Operation in the sclerotica 126
Tremulous iris 126
Prolapsus iridis 127
Variations of colour of the iris . . . 127
Separation of the iris from the ciliary margin . . 127
Absence of the iris 128

SECTION IX.

THE ANTERIOR CHAMBER.

Situation and Use 128

DISEASES.

Inflammation of the capsule of the aqueous humor 129
Effusion of blood 131
Dropsy of the anterior chamber . . . 132
Animalculæ 133

SECTION X.

THE POSTERIOR CHAMBER.

PART FIRST.

The Crystalline humor, or lens . . . 133
Situation and Use 134

DISEASES.

Of cataract 135
Hard cataract 135
Operation for extraction 137
Operation for depression 142
Operation for reclination 143
Soft cataract 143
Operation for solution 144

Page
Operation of keratonyxis 144
The compound operation 145
Injuries of the lens 147
Accidental cataract 147
Capsular cataract 149
Dislocation of the lens 150

PART SECOND.

The vitreous humor 151
Situation and Use 151

DISEASES.

Synchisis oculi, &c. 153
Hæmorrhage 153
Glaucoma 154

SECTION XI.

THE ORBIT AND ORBITAR APPENDAGES.

Contents 155

DISEASES.

Inflammation and suppuration in the orbit . . 160
Tumors in the orbit 162
Wounds 162
Disease of lacrymal gland . . . 162

SECTION XII.

THE LACRYMAL PASSAGES.

Situation and Use 163

DISEASES.

Inflammation of the lacrymal sac . . . 164
Abscess of the lacrymal sac . . . 164
Fistula lacrymalis 165
Epiphora 168

VOCABULARY 169

THE PRINCIPLES

OF

OPHTHALMIC SURGERY.

THE PALPEBRÆ OR EYELIDS.

Structure.—The substance of the eyelids consists of an outer covering of *skin* and *cellular membrane*, the *orbicularis* muscle, *tarsus*, and an inner covering the *conjunctiva-palpebralis*. The margin of the lid, which approximates to its fellow when closed, where the conjunctiva and common integument unite, and in which the *cilia* or eyelashes are planted, is termed the *ciliary margin*. Under the conjunctiva, and between it and the tarsus, are numerous minute bodies called *Meibomian Glands*, which open by excretory ducts into the ciliary margin, for the passage of an unctuous substance which they secrete. The extremity of the lids, where they unite with each other, is called the *angle* or *canthus*, inner and outer, or nasal and tem-

poral, from its position. The inner angle is occupied by a small glandular body called *caruncula lacrymalis*. Under the integuments of the upper lid is also expanded the tendon of the *levator palpebræ*.

Uses.—These are obvious. Taken as a whole the palpebræ defend the globe from various external influences and injuries;—they contract on exposure to strong light, or the contact of irritating vapours and other substances, and being closed during sleep, forming the outer curtains, they prevent the entrance of light, particles of dust, and other matters from lodging upon the conjunctiva. The outer covering and the firm cartilaginous body called the tarsus, form a dense elastic substance, capable of considerable resistance; whilst the intervening muscular structure (orbicularis) contracts forcibly and with a rapidity that is proverbial on the approach of danger. When the source of irritation is removed, or after waking from sleep, the levator palpebræ, acting as antagonist to the orbicularis, separates the lids, and the functions of the globe are resumed. The cilia seem to act as a species of net to entrap small offenders, such as minute particles of dirt, &c. The Meibomian glands secrete an oily fluid which passes through the ciliary ducts and moistens the opposing ciliary margins. The inner membrane (conjunctiva) pours

out a mucous fluid which lubricates and allows a free motion of the lids upon the globe, which is also in part effected by the secretion from the caruncula lacrymalis and lacrymal gland.

DISEASES OF THE EYELIDS.

Inflammation of the palpebræ. Blepharitis idiopathica.—This is sometimes an independent affection, but more commonly it is but an extension of some other inflammatory state of the eye, such as purulent ophthalmia, inflammation of the lacrymal sac, erysipelas of the head and face, &c. There is considerable redness and swelling of the lids, the latter to such an extent often as to prevent their separation, with infiltration of the cellular texture (œdema). When idiopathic, it does not usually spread inward to the conjunctiva. It is produced by exposure to cold, the bites of insects, and other causes. It is very apt to proceed to suppuration (abscess of the lid).

Treatment.—At first the application of leeches, the lotio saturn., and purgatives. When suppuration is inevitable, warm fomentations, poultices, and early evacuation of the matter must be resorted to.

Œdema palpebrarum, as has been stated, is a common attendant of the former affection, and disappears with the inflammation. It frequently, likewise, accompanies anasarca when it depends upon some affection of the heart.

Ophthalmia tarsi. Psorophthalmia.—The inflammation here affects the tarsus, meibomian glands, conjunctiva palpebralis, and ciliary margin. There is considerable prickling in the lid, some intolerance of light, lacrymation, and great itching in the ciliary margins.

Treatment.—In the more acute form the antiphlogistic plan is adopted; but it is seldom requisite to have recourse to anything but a cooling lotion, such as the lot. saturn., ung. zinci, and mild purgatives. In the chronic stage more stimulating applications are necessary, such as a solution of sulphate of zinc or copper (from two grains upwards to an ounce of distilled water), the ung. hyd. nitr. oxyd. &c.

Tinea tarsi. Inflammation and swelling of the edges of the tarsus, with formation of pustules in the ciliary margins.—The inflammation is generally slight and of an indolent character, and is best treated by the stimulating applications just enu-

merated, combined with cleanliness and attention to the digestive organs.

Lippitudo. Tylosis.—This is the same affection as the preceding, but in a more advanced stage, being attended with considerable ulceration and thickening of the edges of the lids, so as to occasion the cilia to fall out (*ptilosis*).

The treatment is similar to that of Tinea. Generally speaking, however, the applications must be more powerful, the ung. argenti nitratis,* ung. hydr. nit. dil., the sulphate of copper, or nitrate of silver, in substance or solution, &c.

Hordeolum. Stye.—A small inflammatory tumor in the ciliary margin, generally proceeding to suppuration. Bread and water poultices, or evaporating lotion are proper at first. In the suppurative stage the matter, if necessary, may be evacuated with the point of a lancet. When a chronic tumor remains, without suppurating, the argent. nitr. may be applied, which will cause it to slough, or it may be excised.

* The ung. argent. nitr. is made as follows: ℞ Argenti nitratis ℈ i: aq. litharg. ʒ ij. cerat. cetacei ʒ x.

The solution of nitrate of silver is usually in the proportion of from two to ten grains to the ounce of distilled water.

Chalazion. Grando.—A small hard tumor on the edge of the lid, supposed to resemble hail, containing a little fluid, which may be removed by puncture or excision.

Milia. Phlyctenula.—These are still smaller ones, of the size of millet seeds, occupying the same position, and remedied by the same means.

Carcinoma of the lids.—It is not different from the same affection elsewhere. It commences in the form of a firm, hard tubercle; ulceration follows, which, if not removed, spreads to the globe. The diseased portion must be completely excised.

Syphilitic ulceration.—The eyelids are sometimes the seat of syphilis in the form of pustules and ulceration, which latter sometimes destroys the lids. It generally accompanies or follows syphilitic affections elsewhere, and puts on a dirty unhealthy aspect, which excites the attention of the practitioner to its origin. It must be treated by mercury internally, and the nitrate of silver, or some other stimulant, externally.

Ptosis. Falling of the upper lid, either from relaxation of the integuments, or paralysis of the levator palpebræ (ophthalmo-plegia).—If it arise

from relaxation of the lid, the remedy is to remove a portion of integument, which is dissected out with a scalpel or scissors;—the quantity must be decided by the nature of the individual case. The edges of the wound are brought together and secured by sutures, &c. The cicatrix thus occasioned frequently remedies the malady. It has been ingeniously proposed by my friend, Mr. Hunt,* to do it sufficiently high, so as to unite the lid to the brow, and thus bring it under the influence of the frontalis muscle. If the affection originate in paralysis, it will often be attended with inflammation or congestion in the orbit or head, and will require active treatment, venesection, leeches, cupping, mercury, counter-irritants, &c. as in similar diseases elsewhere. It has been known as a consequence of injury of the upper part of the spine.

Lagophthalmos. Shortening of the upper lid.—This state may arise from wounds or suppuration of the lid or orbit, which often leave a considerable cicatrix, and thus prevent the lids from uniting. It is generally irremediable. A state similar in its effects may arise from paralysis of the orbicularis, the person not being able to close the eyelids.

* In the "North of England Medical Journal," vol. i.

There is likewise usually an accompanying paralysis of the orbicularis oris and loss of feeling in the neighbouring parts, probably from affection of the fifth pair of nerves. The same treatment, as mentioned for paralysis of the levator palpebræ, must be resorted to.

Ectropium.—Eversion of the lids is more common in the lower than the upper lid. It is often a concomitant of purulent ophthalmia in infants. Generally it is the result of long continued ulceration of the margin of the lids, and is attended with thickening of the conjunctiva, from chronic inflammation, and loss of substance of the exterior covering of the lids. When the thickening of the conjunctiva palpebræ is considerable, attended with much redness, it is called *Ectropium sarcomatosum.*

Treatment.—The application of the cupri sulphas, or argent. nitras, in substance to the morbid surface every day or two, with the occasional application of the ung. hyd. nitr. oxyd. or some astringent lotion, must be steadily persevered in for some time, when a gradual amendment will usually follow. If these means are insufficient, a portion of the mass may be removed by excision. In some instances it is necessary to cut out a triangular

portion of the lid, which is effected by a pair of sharp scissors, the gaping edges of the wound being brought together by sutures.

Entropium.—Inversion of the lids, being attended with great mechanical injury to the eye, from the rubbing of the cilia upon the cornea, is a much more serious affection than the former. Chronic inflammation, ulceration, and opacity of the cornea, are sure to result from this state of the lids.

Treatment.—The object is to restore the ciliary margin to its natural position, which will effectually remove the source of irritation. A cicatrix must be produced in the skin and integuments of the lid, which, by its contraction, will cause the ciliary margin to be placed more outwards. The sulphuric acid, caustic potass, &c. are occasionally used for this purpose. They must be applied carefully, and their application limited to the desired extent, so as to produce ulceration and consequent destruction of a certain portion of integument, the healing and cicatrization of which produces eversion of the margin of the lid. If this be inefficient, a piece of skin may be dissected out with a scalpel or scissors, and the edges of the wound brought together by sutures. The quantity to be removed must be determined by pinching up, between the fingers, so

much integument as serves to produce the required degree of eversion, and that which affects this end will be the quantity to be excised. In very bad cases we are advised to cut out a portion of the orbicularis. When all these prove unavailing, the excision of the ciliary margin, so as to remove the roots of the cilia, must be resorted to. This may be done to the extent of a line and a half from the margin of the lid, taking care to remove all that portion which causes the irritation.

Trichiasis. Inversion of the cilia.—This occasionally happens without inversion of the lid, merely from the unnatural direction of the eyelashes, but nevertheless may produce all the mischiefs of entropium.

Treatment.—Temporary relief is obtained by plucking out the cilia with forceps; but they are soon reproduced, and, if productive of much injury to the eye, the only remedy left will be excision of the ciliary margin, so as to eradicate the bulbs of the cilia, when they cease to be renewed.

Distichiasis.—An extra row, or portion of a row, of cilia, in addition to the natural one, which, if they turn inwards and irritate the eyeball, must be treated as recommended for Trichiasis.

Tumors of the lids.—These may be of an encysted kind, or a mere vascular growth, and are in no respect different from similar tumors in other parts.

Occasionally they disappear by absorption, which may be promoted by some stimulating liniment, (*e. g.* linim. hydrarg. or linim. saponis); now and then they suppurate, and very frequently require excision. When the knife is used, the tumor, being first transfixed with a hook, is easily cut out; or, when it is rather loose and lies just under the conjunctiva, or is situated in the lower lid, it may be excised at once with a curved scissors. This operation is always performed from the inside of the lid, which must be previously everted and kept in that position by an assistant.

Encanthis.—An enlargement of the caruncula lacrymalis, which may be removed by the occasional application of the nitrate of silver, or excision with a sharp scissors.

Epicanthis.—A fold of skin covering the internal canthus. It is congenital and may be easily dissected off.

Nævi materni.—They are to be treated as in other parts. If large, the seton or ligature may be

resorted to; if small, vaccinating the diseased part will often succeed in removing it.

Adhesions of the lids to each other *(ancylo-blepharon)*, and to the globe *(sym-blepharon)*, are occasionally seen. The first is congenital, and is the natural state of the eyelids in the fœtus; the latter is the result of severe injuries such as lime, mortar, &c. getting into the eye, and occasioning the adhesive inflammation. A careful separation by dissection may sometimes be successful, but too often fresh adhesions take place after every attempt of this kind. Oil dropped into the eye has, in some instances, seemed to prevent this disposition to the adhesive inflammation. Goldbeater's skin interposed between the divided surfaces is sometimes useful in this way.

Destruction of the eyelids is occasionally observed as a consequence of burns and other serious injuries. In one case of this description, I thought of attempting the formation of an artificial eyelid, but the case did not seem sufficiently favourable for such an experiment.

Congenital deficiency of the palpebræ, or some portion of them, has been occasionally met with. One particular deficiency consists of a separation

or slit into two parts, somewhat similar to hare-lip; it is called *coloboma palpebræ*.

THE TUNICA CONJUNCTIVA, OR ADNATA.

Structure.—The conjunctiva is the thin, delicate, semitransparent membrane which lines the palpebræ internally, and from which it is reflected upon the firm covering of the globe, called the sclerotica, and according to some is continuous over the expanded cornea, whilst others describe it as terminating at the margin of the cornea. It is also represented as passing down the puncta lacrymalia into the lacrymal sac and nasal duct to the nose. Names are given to its different portions corresponding with the part with which it is connected, such as *conjunctiva palpebralis*, *conjunctiva scleroticæ*, *conjunctiva corneæ*.

Use.—To serve as a bond of union between the eye and its appendages, and, in some measure, as a defence to the other tunics of the globe. It is usually considered as a secreting membrane, and has a mucous fluid poured out on its surface to facilitate the motions of the eyelids upon the globe. Some consider that this lubricating fluid is se-

creted by the caruncula lacrymalis, follicles, and lacrymal gland, and not by the conjunctiva,—perhaps they all contribute to its production.

DISEASES OF THE CONJUNCTIVA.

Conjunctivitis. Simple ophthalmia.—Inflammation, when limited to the conjunctiva, and in its simplest form, is seldom a disease requiring very active treatment, or producing much danger to the eye itself; although it may be a source of great distress and inconvenience to an individual labouring under it. This distress arises from two sources,—the almost constant irritation of light, and the mechanical friction of the eyelids upon the vascular and excited conjunctiva.

Symptoms.—Increased vascularity (blood-shot); painful sensation in the membrane, as if from the presence of sand, increased on exposure to light, or the motions of the eyelid; copious discharge of scalding tears, occasioned by the lacrymal gland and the other parts of the lacrymal apparatus participating in the diseased action of the conjunctiva, or sympathizing with it: and occasionally headache and other febrile symptoms are present.

Causes.—Exposure to cold or damp atmosphere; sudden heat or strong light; mechanical injuries, such as particles of dust lodging in the folds of the membrane, &c.; constitutional predisposition, &c.

Treatment.—In the generally mild form of this disease no very active treatment is required. Mild purgatives, abstinence from stimulating food and drink, the application to the lids, externally, of a thin fold or two of linen cloth wet in a simple evaporating lotion, warm or cold, as is most agreeable to the feelings of the patient. If these are insufficient, or the disease assume a more active form, then the application of a few leeches to the eyelids, or bleeding from the arm, according to the intensity of the attack, will be found available in subduing it.

In the subacute stage, the practice of scarifying the conjunctiva is often useful. According to the advice of Mr. Wardrop, it should be confined to the portion of the conjunctiva lining the lower lid. Counter-irritation is also serviceable, from blisters or the tartar emetic ointment to the temple, behind the ear, or to the nape of the neck.

If the inflammatory condition of the conjunctiva be occasioned by the presence of any foreign body, such as a particle of dirt or other substance, the primary object will of course be its removal, which is in general easily effected by the finger, or, if

embedded, it may require the point of a lancet for its removal. If the foreign matter be lodged under the upper lid, this will require to be everted, and we should always do this when nothing is found attached to the inferior folds of the conjunctiva, or the lower lid. For want of following this rule, I have known patients suffer a long time unnecessarily, the surgeon having pronounced the absence of any foreign body, when in reality it has been found lodged in the conjunctival covering of the upper lid. The process of everting the upper lid is very simple: the thumb and forefinger of the left hand seize the cilia and ciliary margin, whilst a probe or the forefinger of the other hand depresses the substance of the lid, when the inside is immediately brought into view, and the foreign matter is detected.

When, from neglect or other causes, the disease has assumed the chronic form, a different line of treatment must be adopted. We must now have recourse to stimulants. The sulphate of zinc in solution (two or three grains to the ounce of water) may be used as a collyrium. In obstinate cases, particularly if the disease spread to the cornea and occasion opacity of its structure, stronger applications will be required, such as the sulphate of copper or alum, in solution, &c. Occasionally a morbid vascularity of the conjunctiva,

upon which may be observed little roughnesses or elevations, remains, and which will yield to nothing short of the cupri sulphas or argenti nitras, in substance. If this state be not remedied, it may be expected to proceed to the diseased condition termed *granulations*. It is more particularly observed in the lower lid.

On the subject of eye lotions, it may be noticed, that they consist of two kinds, one applied externally to the palpebræ, for the purpose of cooling the organ by evaporation; the other internally, for the purpose of stimulating the conjunctiva.

In the treatment of ophthalmic inflammation this distinction should be kept in view, as, if you want merely to produce evaporation, the lotion should be confined to the external parts; if, on the contrary, it is desired to stimulate the conjunctiva, the lotion must come in contact with it. The simplest lotion applied to the conjunctiva acts as an irritant.

Catarrhal ophthalmia. Conjunctivitis catarrhalis. —The leading symptoms of this affection are as follow:—highly increased vascularity of the conjunctiva, sometimes amounting to *chemosis;* sense of irritation as from sand, occasioned by the mechanical distension of its vessels; considerable discharge of a mucous, flaky character from its surface; with other catarrhal symptoms in the nos-

trils, &c. The intolerance of light, which is common to all the forms of conjunctival inflammation, is usually much less here in proportion to the vascularity observed.

Causes. — It seems to be produced by atmospheric influence, as in ordinary catarrh: and from the circumstance of its spreading through families, as it sometimes does, it is apparently contagious.

Treatment. — The ordinary treatment of this form of ophthalmia consists of leeching, blisters, a slightly astringent lotion (of alum or zinc solution), and purgatives. In slight cases these will be sufficient, but if the attack be severe, it will be more speedily suppressed by drawing the nitrate of silver along the inner surface of the lower lid, which will diffuse its effects over the whole of the conjunctiva; or, if this be disliked, a solution of the argent. nitr. may be dropped between the lids once or twice a day. I have found this practice very successful in suppressing the discharge, and the inflammation which produces it; but no treatment will stop it suddenly, as, like most other contagious diseases, it appears to have a certain duration.

Purulent ophthalmia. Egyptian ophthalmia. — A great variety of names is given to this form of ophthalmia, suited to its origin, distinctive marks, mode of propagation, &c. It is one that has ex-

cited, more perhaps than any other, the attention of surgical practitioners, but not more than its importance merits; and, accordingly as it is treated, is one of the most fatal to vision, or a triumphant proof of the resources of the medical art.

Symptoms.—These are somewhat allied to those of catarrhal ophthalmia, but more severe. The most striking of them is the profuse discharge of a thick, yellow, muco-purulent fluid, which is constantly pouring from the conjunctiva, and, when the lids are closed, lodges in and distends the folds of that membrane. The next most obvious symptom is the excessive swelling and distension of the eyelids, which cannot be opened without forcible separation. On separating them we observe, after the matter is wiped off, the extreme redness and vascularity of the conjunctiva, the œdematous appearance of the cellular texture under the mucous membrane, and the cornea almost buried in the overlapping folds of the distended and loaded conjunctiva. It is not wonderful that in this condition there should be violent pain in the affected part, or that it should extend to the orbit and its neighbourhood, accompanied, as it always is, with great intolerance of light, and more or less disturbance of the constitution.

Causes.—The disease is often observed in persons who can give no account of its origin, whilst

on the contrary, it may frequently be traced to contagious influence, the matter from one infected person producing it in another. There is no doubt, also, that the matter of gonorrhœa applied to the conjunctiva, is capable of exciting this disease in its most aggravated form; and there are strong grounds for believing that irritating discharges from the mother will produce it in infants soon after birth. That it will also arise independently of these sources, is equally certain. Many cases may, to all appearance, be traced to similar causes, which originate simple ophthalmia, such as exposure to wet and cold, irritants applied to the conjunctiva, &c. It is a complaint which is very prevalent in the East, particularly in Egypt, from which circumstance it obtained the name of Egyptian ophthalmia, and is there probably produced by the irritation from sand getting into the eyes, as well as the reflection of the sun's rays.

Treatment.—Amidst the various modes of treating this affection, adopted by different individuals, there is no difference of opinion as to the propriety of using vigorous and powerful remedies, and that these should be early and promptly applied. Two very opposite plans, however, are laid down for the management of this most formidable disease. On the one hand we have arranged, in due order, copious venesection, cupping, leeches, blisters, pur-

gatives, and last, though apparently not least, the tartar emetic, which we are directed to give, so as to keep up a state of constant nausea, perspiration, and faintness,*—one would think no difficult matter to effect after the patient had been duly prepared by the preceding remedies.

On the other side, the following equally potent remedies have been advised in the form of local applications, — the undiluted liquor plumbi subacetatis; strong solutions of sulphate of copper, nitrate of silver, and oxymuriate of mercury; oleum terebinthinæ; vinum opii; the sulphate of copper in substance; the ointment of nitrate of silver; and last, though certainly not least in efficiency, the nitrate of silver in substance.

If the former line of treatment be adopted, it is evidently applicable only to the first stage of the disease. In strong, plethoric persons, where the inflammatory action runs high, and is attended with febrile excitement, no possible harm can result from one moderate bleeding; but to carry it to the point recommended by some persons, is exceedingly absurd, inasmuch as it will be highly injurious to the constitution of the sufferer, rendering it less able to struggle successfully through the after stages of the complaint, or to repair the

* Travers's "Synopsis of the Diseases of the Eye." Third edition, 1824, p. 272.

mischiefs which frequently result from it. My experience of this disease has led me to conclude that the subjects of it are not usually of that description in whom we should willingly order very copious venesection; indeed, the constitutional disturbance has never been at all marked; if anything rather depressed than excited: in short, my impression of the disease is, that it is strictly local, and that it should be treated as such. If, therefore, the loss of blood be necessary, it appears to me that the local abstraction of it is to be preferred, and that it will be best effected by the application of a moderate number of leeches placed upon the eyelids, the drain from which will have a tendency to lessen the congestion of the vessels; that this practice will be often useful, I have no doubt. Counter-irritation by blisters, &c. may be of some benefit, but is not likely to influence the disease to any extent.

The tartar-emetic seems admirably adapted to depress still further a state of constitution which will soon be sufficiently depressed without it. Useful as this remedy may be in acute internal diseases, I should no more think of using it here than in any other ordinary local affection.

That the antiphlogistic plan of treatment is inefficient, will appear from the want of success attending it. Dr. Vetch, who took fifty or sixty

ounces of blood from patients affected with this disease, reports, that fifty cases out of six hundred and thirty-six, lost the sight of both eyes, and that forty more were blinded in one eye, and this, under every advantage, the patients being soldiers in a military hospital, and of course under strict surveillance. Most writers who advocate the antiphlogistic treatment, are compelled to admit that, in spite of its being employed most energetically, the disease will frequently terminate in destruction of the eye. I have myself seen many instances, where it has been duly followed up, in which it has completely failed to influence the progress of the disease, which has gone on to the destruction of both eyes. If, therefore, it has failed in the hands of individuals who have used it fairly and promptly, how much more likely is it to do so in those of practitioners in general, who in this disease seldom have recourse to more than half measures. The hundreds of people, old and young, who are constant victims of this destructive malady, speak in a language that cannot be misunderstood, that our plans of treatment are anything but effectual in combating it; and as the antiphlogistic (or something which goes under this name) is the plan usually adopted, upon it only can we lay the blame, which attaches somewhere.

If, on the other side of the question, we examine

carefully the result of the stimulating treatment, we shall have ample reason to conclude, that as the affection itself is a local one, so the remedies must be strictly local also. Dr. O'Halloran, who, as an army surgeon, had extensive opportunities of treating this disease, having become dissatisfied with his want of success from the antiphlogistic treatment, began the use of sulphate of copper applied to the inner surface of the lids, or dropped into them a ten-grain solution of nitrate of silver, which he generally repeated daily. He expresses his opinion that bleeding is unnecessary, and says, that he has treated hundreds of cases with the stimulant treatment, and always with the greatest success.

Mr. Guthrie has been very successful with an ointment, in which the nitrate of silver is the prominent ingredient, and which is placed with a spatula, or brush, between the eyelids, so as to come in contact with the conjunctiva. Dr. Ridgway appears to have been the first to recommend the nitrate of silver in solution in these cases.

Feeling a similar dissatisfaction with the antiphlogistic plan, I resolved to have recourse to the stimulating treatment in the very first case I had under my own exclusive care. I was of course aware that it had been used before; but independently of that knowledge, this case immediately

struck me as the one for this treatment.—In a paper published in "The Lancet,"* I gave a detailed account of the case, in which I had recourse to the nitrate of silver in substance, applying it to the inner surface of both eyelids once a-day for the first week, and afterwards every second or third day, until the morbid state of the parts had disappeared. I have used it since then in many instances, in all ages, and in every stage of the complaint, with the most gratifying result. It can be applied with much greater facility than any liquid or unctuous substance. It is simply necessary to separate the lids, when eversion is sure to take place, and the pencil of the nitrate of silver is drawn lightly across the conjunctiva, which is but the work of an instant. The pain is not so severe as many persons may suppose, and soon subsides. The name which is sometimes given to this substance of *lunar caustic* seems to have constituted it a complete bugbear. Its application is, from this cause, contemplated by some with a degree of horror, for which there is not the slightest occasion. It is, in truth, no caustic; for no destruction of surface, or at all events, very slight, and consequently no cicatrization, ever results from its use.

Little else need be done. Attention to cleanli-

* August 13th, 1831. See also other cases in that Journal, March 8th, 1834.

ness, and the frequent washing out of the matter from the surface of the eye, with a solution of alum or sulphate of copper, with attention to the general health, as may be required, constitute the essential points. It must be remarked, that under the best kind of treatment a certain period will elapse before the diseased action subsides. This will vary according to management, but in severe cases it will seldom be under six weeks.

In the preceding remarks the disease has been considered in its simple, though perfect form, in which it is confined to the conjunctiva. That it should pass onwards to the cornea is not to be wondered at, when we remember that its outer surface is but a continuation probably of the conjunctiva. It seldom happens, therefore, that the cornea escapes from a participation in the disease. If this were not so, indeed, the affection would be comparatively harmless, as no danger to the organ could possibly result whilst it remained a simple conjunctival inflammation, however harassing it might prove to the feelings of the patient. The state of the cornea is always the object of solicitude: so long as it remains sound and free from contamination, we have nothing to fear. If, however, the mischief extends to this more important portion of the eye — if the vascularity spread over its surface, or its coats become ulcerated or

sloughy, then we shall have but an indifferent chance of restoring the organ to its pristine integrity. At all events, our treatment must be well directed and judiciously chosen. Here, however, there is not so much diversity of opinion, it being pretty well agreed, nearly on all hands, that this is a state which calls for the use of stimulant remedies. No one now thinks copious bleeding or tartar-emetic necessary in this condition of affairs. Generally, when the disease has proceeded thus far, the bright scarlet hue of the vessels is changed to a dull red, the discharge is more watery, but still very copious, and the pain somewhat diminished. This forms a distinct stage of the affection, and may not occur until after some days have elapsed, although it may now and then do so at a very early period. The remarks on the use of the nitrate of silver, previously made, apply here most indisputably, and need not be repeated. It must be applied also to any ulcerated portion of the cornea, and will generally prevent its extension.

When, however, a sloughy action of the cornea is once established, there is no certainty of the result. The diligent and regular application of the nitrate of silver once or twice a-day, will, in some instances, prevent its penetrating the anterior chamber; but, if this take place to such an extent as to allow of the exit of the crystalline lens, little

hope can be entertained of the return of any useful degree of vision. The other humours also become evacuated, and the globe sinks to rise no more, except it may be now and then, in the ungainly and disagreeable form of *staphyloma*. Lesser degrees of ulceration, in which only a portion of the iris escapes, may heal without much deformity; but if this takes place at several points, the probability is, that staphyloma will succeed, and the eye be rendered useless. Sometimes considerable opacity remains, which may obscure the pupil, and thus destroy vision: if any portion of the cornea be left clear, there may still be hope of regaining useful sight, by an operation for artificial pupil.

Gonorrhœal ophthalmia.—Some writers think it necessary to treat of the purulent ophthalmia arising from, or attended with, gonorrhœa, under a separate head; although I am unable to discover the grounds of distinction. The symptoms are the same, but, they say, more aggravated. It is not easy to see how they can be worse than in the state just described, in which the patient too often is totally deprived of sight. Gonorrhœal ophthalmia is said to be confined to one eye, which is far from being quite correct. The treatment at all events is not different; and if the progress of the disease be more rapid, so much the more prompt must we be with our remedies.

Purulent ophthalmia in infants. — Little further need be said on this point, than that the disease, being essentially the same as in adults, requires precisely similar treatment. If the inflammation be very active, as it often is at its commencement, a leech or two may be applied to the palpebræ externally, with the frequent injection of alum lotion, and the use of mild purgatives. When the puriform discharge is established, and the lining membrane exchanges its bright red for a paler hue, and more particularly if the cornea become opaque or ulcerating, then the disease must be attacked with the stimulant remedies, such as the injection of the solution of nitrate of silver, or the application of the solid substance. I prefer the latter in infants as well as at any other period of life. I have used it as frequently, and continued it as long in these as in other cases, and with the same pleasing results. I conceive we need never allow any case to get worse under this treatment, efficiently employed. Applied cautiously, it is not productive of much suffering, certainly not more than any of the other stimulants previously noticed, the child usually crying but for a short period; and if it suffered ever so much it would be of little moment compared to the danger of the eye. Of course it would be unnecessary to have recourse to it in a mild case, where no danger is anticipated.

When the antiphlogistic treatment alone is employed, it is customary to recommend, in the ulcerated state of the cornea, the internal administration of extract. cinchonæ, &c.; and certainly not without reason, if the severe depleting measures, before alluded to, have been adopted. The argent. nitratum is used on the same conservative principle, but being applied to the part itself it operates directly, whilst the other, having to traverse the system, can therefore produce any beneficial effect but very remotely.

Strumous ophthalmia. Inflammation of the conjunctiva, of a specific character, modified by a scrophulous habit of body.—It is most commonly met with in children, after the period of infancy, and young persons.

Symptoms.—These are increased vascularity, not always in proportion to the other symptoms; great intolerance of light, more so than in any other disease of the eye; copious lacrymation; often great tumefaction of the eyelids, sometimes of the face, glands of the neck, and other parts: phlyctenulæ, or small pustules are also frequently noticed about the margin of the cornea. The intolerance of light attending this disease is spoken of as if it were owing to the retina participating in the morbid sensibility. There seems no ground

for such a supposition, as the patient can see well enough when in a shady place, and it is sufficiently accounted for by the vascular condition of the conjunctiva and cornea, for the latter generally shows evidence of an extension of the disease to its covering, in the presence of more or less muddiness or opacity. A common attendant of this affection, and which is sometimes ascribed to the tears irritating the eyelids and face, but which is often seen without affection of the eye, consists of an eruption of pustules, which, discharging, and the matter collecting on the surface, in the form of a crust or scab, is denominated *crusta lactea*, or *porrigo larvalis*. It is frequently seen covering the whole of the face, head, and in various parts of the body.

Causes. — A peculiar morbid diathesis, in conjunction with other more immediate causes, such as poor living, deficient clothing, dirty habits, exposure to cold and damp atmosphere, &c.

Treatment. — If there be active excitement in the conjunctiva, particularly if the cornea participate, the application of leeches to remove the state of congestion, combined with blisters to the nape of the neck, or behind the ears, mercurials, purgatives, and the mild antiphlogistic treatment, are usually resorted to with more or less relief. If ulceration of the cornea have commenced, it will

be necessary to use the more stimulant applications. The pencil of the nitrate of silver must be lightly touched against the diseased surface both of the conjunctiva and cornea, which will generally be the best practice in the indolent stage of the disease, in which ulceration usually appears. Notwithstanding that we may have removed all evidences of the affection, as far as the eye is concerned, it is so very apt to recur, that we shall have great difficulty in pronouncing the patient safe from a subsequent attack. To guard against this, the constitution of the patient must be strengthened by good living, pure air, warm and dry clothing, the internal use of quinine, and other tonics, sea-bathing, &c. When, from want of attention, or other causes, the disease has become, as it were, habitual, and has assumed a fixed chronic form, the internal and external use of iodine, combined with general and local treatment, has been found advantageous. Among other local applications may be noticed the liquor opii sedativus (a dram to an ounce of water) dropped into the eye, the solution of nitrate of silver, the ointment of the same, the red precipitate ointment, the sulphate of copper and nitrate of silver, in substance to the conjunctiva of the palpebræ, &c. The *crusta lactea* is best treated, with the oxyd of zinc, applied to the part locally, in the form of

ointment, lotion, or the powder dusted upon the surface.

Pustular ophthalmia.—Inflammation of the conjunctiva, with formation of pustules, generally around the margin of the cornea, sometimes extending upon it, and occasionally on the conjunctiva palpebralis. Like strumous ophthalmia, with which it is often combined, it is usually confined to children and young persons.

Causes.—Similar to other ophthalmiæ, and often combined with strumous constitution.

Treatment.—In acute cases, leeches, blisters, purgatives, with an evaporating lotion. In the chronic form, stimulating applications are resorted to, such as touching the pustules with the point of the nitrate of silver, particularly if in a state of ulceration. The rules laid down for the treatment of the former complaint are applicable here.

Erysipelatous, or *Œdematous ophthalmia.*—Inflammation of the conjunctiva of an erysipelatous or œdematous character.

Symptoms.—These are sufficiently explained by the terms adopted in describing the affection, increased vascularity of the conjunctiva, with serous effusion into the cellular texture underneath it.

Causes.—Similar to erysipelas in other parts,

the result of a peculiar, unhealthy state of the constitution.

Treatment. — Emetics, purgatives, and other means to remove the constitutional affection. Warm fomentations are best as local means, but if the inflammation be unusually active, or extend to the sclerotica, cupping or blisters may become necessary.

Ophthalmia variolosa, morbillosa, or *scarlatinosa.* — Inflammation of the conjunctiva, sometimes of a very acute character, attends the progress of the various eruptive diseases. They do not require any separate consideration, as they are to be treated on the general principles laid down in mentioning the other forms of ophthalmia. The pustules of small-pox affecting the eye are the most serious, particularly when upon the cornea. What is said elsewhere on ulcers of the cornea, apply to their treatment.

CHRONIC DISEASES OF THE CONJUNCTIVA.

Pterygium. — A morbid, vascular growth from the conjunctiva, sometimes membranous, at others fleshy, assuming a triangular shape, the apex ad-

hering to the cornea,—generally on its margin, occasionally extending to its centre.

Causes.—It is frequently produced without any preceding inflammation, but occasionally is observed as a result of purulent or other severe form of ophthalmia, from adhesion of the conjunctiva to the ulcerated surface of the cornea.

Treatment.—The cure of this affection can seldom be accomplished except by excision, which is effected by passing a probe under it when it is loose, or seizing it with forceps and introducing the blade of a small pair of scissors, so as first to separate it from the cornea, and afterwards from the conjunctiva. The application of the nitrate of silver sometimes diminishes its size, but excision is the more certain, as well as the more expeditious, process.

Granulations of the conjunctiva.—A rough, elevated state of portions of the conjunctiva, somewhat resembling granulations in a wound, a consequence of purulent or other active inflammation of the membrane, usually confined to the lining of the eyelids. From the mechanical irritation and friction of the uneven surfaces upon the cornea, it frequently produces the same serious opaque or ulcerated state, which is a consequence of Entropium.

Treatment.—The first object is the removal of the irregular, uneven surface of the conjunctiva, which, if very prominent, will be best effected with the knife or scissors; if less considerable, it will be accomplished by the steady application of the sulphate of copper, or nitrate of silver. Until this state is removed, all other treatment will be unavailing. The application must be repeated every day or two, until the conjunctiva is restored to its natural smooth and polished surface.

As this approaches, the cornea, if not too seriously injured, clears up, from the healing of the ulcers and removal of the opaque matter. To assist the dispersion of the opacity, local stimulating applications to the cornea will be sometimes required, such as the vinum opii, guttæ hydr. oxymuriatis, &c. If active inflammation should coexist, leeching and other antiphlogistic remedies must be resorted to.

Fungus growths from the conjunctiva are remedied by the same means as the granulations.

Xerosis, or Xeroma conjunctivæ.—In this state the conjunctiva loses its character of mucous membrane, and becomes preternaturally dry, putting on the appearance of common integument. It is a very unusual condition, and but little is known of it.

Ulcers of the conjunctiva, being generally attended with an indolent, inactive vascularity, are best treated with stimulant applications, regulated in their strength according to the inactivity or irritability present.

Chemosis, *Ecchymosis*, and *Pannus*. — The term *Chemosis* is applied to that state of the conjunctiva in which the whole of the membrane is highly vascular and loaded with blood, as in purulent ophthalmia; *Ecchymosis*, when it exists in a limited extent. The term *Pannus* is applied where not only the conjunctiva, but the cornea likewise, is almost entirely occupied by a highly vascular membrane. These form but a portion of some general inflammatory condition, the removal of which will occasion their disappearance.

THE GLOBE, OR EYEBALL.

From its outer coverings we proceed to the eyeball, and shall give a general outline of its composition, use, and those diseases which seem to implicate nearly all its textures, — reserving for after notice the structure, functions, and morbid conditions of its individual parts.

The importance of the eye may be conceived from its elevated, secure, and commanding position

in the animal body. The organ of vision, strictly speaking, is a very small portion of the eyeball, namely, the expansion of the optic nerve, the retina. All the rest of the globe is to be considered merely as an optical apparatus. It differs only from an optical machine, inasmuch as it is endowed with living, sensitive, and moving properties. Its sensitive and motive powers cause it to perceive and shrink from contact with external agents, which might be injurious to it; whilst its vital properties enable it to recover from the effects of injury or disease, as well as to render it less liable to be influenced by them. With this organ deficient, what a blank is left in the human countenance! We are only properly aware of its extreme beauty and importance, by noting the effects which follow its absence or destruction. Poets and philosophers have each, in their turn, descanted upon the physical and moral injury which that being sustains who is deprived of the faculty of vision, — that blank and cheerless condition is more easily fancied than related!

The eye has been said to be an epitome of the whole body, from the great variety of textures of which it is composed. There are the bones of the orbit almost encircling it, so as to form a solid defence from greater injuries; muscles to enable the organ to follow or search for objects of the

material world surrounding it; nerves to enable these muscles to act and to give sensibility to the eye; blood-vessels—arteries, veins, and absorbents —to keep up a due supply of new matter, and to remove the old; fibrous and cartilaginous membranes for support and defence to the more delicate nervous, vascular, and fluid contents of the globe; mucous membranes for the lubrication and free motion of the eye and its coverings, &c. &c.

The eyeball, we have said, when removed from its orbitar connections and appendages, consists of two distinct portions, viz. the organ of vision, and the optical apparatus for collecting and impressing upon the former proper pictures or representations of external visible objects. The former of these is the fine, transparent expansion of the optic nerve, called the *Retina:* the latter consists of a number of parts, solid and fluid, which must be noticed in due order.

The optical apparatus, being in fact a living *camera obscura*, consists then of the whole of the contents of the globe, with the exception of the retina, and is divided into two compartments, or chambers, of very different dimensions, called from their situation anterior and posterior.

The *anterior chamber* is formed externally by a very firm, transparent, convex covering, which is at once as clear as crystal, and as firm as cartilage,

and which, from this firmness, is called the *cornea.* Its internal boundary is marked by a delicate, musculo-membranous partition, having a plane surface, stretching like a curtain across the interior of the globe, and perforated by a nearly central aperture, which is capable of contracting and enlarging itself. This partition is called the *Iris*, and its opening the *pupil.* Between these two membranes (the iris and cornea), and filling up the space, properly the anterior chamber, is a quantity of clear fluid, called the *aqueous humor.*

The *posterior chamber* comprises, by far, the largest portion of the globe. It is formed externally by the *Sclerotica*, its chief defence; internally and laterally by the *Choroid*, which lies upon the inner surface of the sclerotica, and forms a dark groundwork on which objects are represented, and on which the retina is immediately expanded, as a looking-glass on the mercury beneath it; anteriorly by the posterior surface of the Iris, called the *Uvea;* and the centre is occupied by the *crystalline lens* in front, and the *vitreous humor* behind, for the convergence and passage of the rays of light to the retina and choroid.

If the globe were divided into its external coverings and their contents, they might be thus arranged;—externally, the cornea and sclerotica forming the solid outer covering, the former trans-

parent for the passage of light, the latter opaque to exclude it; internally, the iris to regulate the admission of light into the posterior chamber,—the choroid to form a dark nidus impervious to light,—the retina for receiving images, and conveying them to the optic nerve; and the different humors, aqueous, crystalline, and vitreous, for the refracting and converging of the rays of light in their passage to the bottom of the eye.

Use.—Taken as a whole, the globe is intended as an instrument to procure, for transmission to the brain, correct images or pictures of objects in the external world. Light is the medium by which such representations are conveyed into the eye,—hence it is necessary, that this instrument should be formed in such a manner as to admit light passing into it, so as best to effect this object. The eye is indeed considered a perfect model of an optical instrument, and quite incapable of being improved. It is placed in such a situation, being the most exposed and prominent part of the system, as best enables it to collect the rays of light as they are reflected from bodies which surround it; whilst its shape is the best of all adapted for bringing those rays into a proper focus, so as to form a correct image of the object they are reflected from.

Philosophers are divided in opinion as to the nature of light: by some it is considered as a very

subtile, imponderable species of matter; whilst "others conceive that it consists in certain undulations, communicated by luminous bodies to an ethereal fluid which fills all space."* In plain words, one would imagine that the first class of philosophers considered light to be a real something, and that the latter conceive it to be nothing. When we consider that it is not merely the medium by which other objects are seen, but that it is itself visible, and that it has also the property of not merely exciting but irritating the eye, we are naturally enough led to believe that it is a real, material substance. Although usually in combination with heat, as in the sun's rays, it is separable from it. Light and heat are both active stimulants: without light, as without heat, all animal and vegetable substances must soon perish. Light, although it acts generally upon animal bodies, and is apparently absorbed by them, or generated in them, has a peculiar influence upon the eye. It is light which is, in an especial manner, its appropriate stimulus. This sensibility to light, is probably somewhat different from common sensibility, although by some it is considered as only a modification of it. In this respect it is like the tongue, which has its common sensibility, and a peculiar sensibility to taste: so the eye possesses its com-

* Ure's "Dictionary of Chemistry." Article, Light.

mon sensibility, and its peculiar sensibility to light. Each of them derives its sensibility, both common and peculiar, from the same source, viz. the fifth pair of nerves.

The corresponding effects of light upon certain flowers, their regular contraction and expansion,—not to say anything of their similarity in form, and in variety and beauty of colour — as compared with the organs of vision, may be considered somewhat fanciful, but are nevertheless perfectly analogous; and it seems not unreasonable to suppose that light may act upon the eyeball generally, and the eyelids, and that it may stimulate the organ in a similar manner to what we observe in the portion of the vegetable kingdom alluded to. This part of the animal body certainly bears a greater resemblance to the vegetable structure than is generally considered. It is true there is a very important distinction, inasmuch as the animal possesses a voluntary control over the organ; but how many of its actions are perfectly involuntary! Is it the efforts of the will that keep the eyelids separated the whole day, whilst we are occupied with our ordinary avocations? Is it the efforts of the will that cause them to be closed all night, during the hours of sleep? Certainly not. We know how difficult it is to keep them open when the body is oppressed and wearied for sleep; and it is equally

a troublesome effort to keep them shut when we are in a state of activity. The tendency to close that the eyelids evince when in a state of darkness, and that to expand under the influence of light, may be considered, then, as bearing a striking analogy to the corresponding phenomena noticed in certain productions of the vegetable world.

In the eye a moderate degree of the stimulus of light seems to cause expansion; whilst an excess, as well as an absence, produces the opposite effect. It is well known that we are much more prone to sleep in dark winter mornings, and the reverse. It is the same in dull days: we feel a heaviness of the eyes and contiguous parts; and to arouse ourselves into exertion, we employ friction over the face and eyebrows, as well as the eyelids, in order to stimulate the branches of the fifth pair, which are insufficiently excited by the diminished supply of light.

It has been the custom, however, to consider the retina as peculiarly the seat of sensibility to light; but many facts go to prove that this sensibility is not dependant upon the retina, but is derived from the fifth pair of nerves. In a case of disease of the fifth pair, where the taste, feeling, and voluntary motion were all impaired, this sensibility to light was gone, although vision — the function of the retina — remained entire; and in paralysis of the

retina, it is not unsual to observe this sensibility to light remaining. In M. Magendie's well-known experiments, after division of the fifth, he found the eye of the animal insensible to the stimulus of light. Hence he was led to imagine, that vision was destroyed by that injury, which was certainly a great mistake, arising from his not having made this distinction between sensibility to light and vision, two very different properties. Those experiments proved that the fifth has great influence over the eye, but to infer, as Magendie did, that it is therefore the nerve of vision, was carrying the induction farther than the premises warranted.

Some individuals, supposing that this sensibility to light resided in the retina, have been unable to account for its possessing this quality, seeing that it has no connexion with the nerve of sensibility; — hence Dr. Macartney was led to predict, that one day or other a branch of the fifth would be discovered penetrating to the retina. At present this prediction remains to be fulfilled.

If the retina be sensible to the stimulus of light, and the contraction of the pupil be for the purpose of defending it from this stimulus, we might expect that where no iris exists — a not unfrequent congenital deficiency — the intolerance of light would be extreme; whereas I should be inclined to say, from an instance I have myself observed, that

it is imperfection of vision from the optical deficiency, rather than dread of light, which is experienced.

The same may be said of the Albino. I recollect once asking a person of this description, whether the light was not very painful to her: it was a sunny day. Her reply was, "No, it does not hurt me, but I cannot see so well." The terms intolerance of light and indistinctness of vision, are often used as synonymous, when speaking of these individuals. It is the optical deficiency which inconveniences them.

In ordinary inflammation of the external parts of the eye, whether it arise from a particle of dust or any other cause, and where the retina cannot possibly be affected, there is the greatest intolerance of light; whilst in the most destructive internal inflammation, there is generally infinitely less dread of light, and sometimes none at all. It may be mentioned as confirmatory of this view, that the pain in the eye, eyebrows, and head, which accompanies ophthalmia, is always diminished by lessening the supply of light to the individual; and that the pain felt is always in those parts which are supplied by branches of the fifth.

Persons who, from their occupation, expose their eyes to a strong glare of light, and others who inhabit high northern latitudes, such as the

Tartars, where the light reflected from the snow is very injurious, producing what is termed snow-blindness — and which consists not in Amaurosis, or affection of the retina, but in inflammation of the external tunics — are in the habit of defending the external parts of the eye by a frame, with a central aperture for the light to get to the retina. It is quite evident that the object of such individuals is to defend the sensitive, exterior portion of the organ, whilst as much light as ever must pass through the pupil to the retina. Indeed if it be the retina that requires to be defended, the closure of the pupil must be the only effectual relief in these instances, a process which would be incompatible with vision, and which never, under any circumstances, takes place.

This view is further strengthened by the fact, as stated by the best authorities, that certain mammalia and reptiles, in whom the eye is in an imperfect, rudimentary state, and who have no optic nerve, and consequently no vision, have nevertheless a sensibility to light, which they receive from the ophthalmic branch of the fifth pair, the only nerve which enters the eye ;—such are the mole, shrew, mus capensis, proteus, &c. Many of the zoophytes also exhibit distinct indications of a sensibility to light without the slightest trace of an organ of vision. In the annelida a near ap-

proach to an optical apparatus is found, but in so simple a form that it is believed they possess merely a sensibility to light, and have no perception of objects.

Thus it appears evident, from all these facts, that sensibility to light and vision are two distinct attributes, possessed by different portions of the organ of vision; that they are independent of, and may exist without, each other; and that the sensibility to light exists in the exterior of the organ, and is derived from the fifth pair, whilst vision is the function of the retina through the optic nerve.

The question of the dependence of the motions of the iris upon the retina, is treated of at page 108.

To proceed to the manner in which light passes into the interior of the eye. Light, in passing from a rarer to a denser medium, changes its direction, becoming refracted or bent, so that in passing from the atmosphere through the cornea, this bending causes its rays to pass towards the pupil, and this in a greater degree from its convex shape, than it would have done had it been a plane surface. Many of the rays, notwithstanding, do not enter the pupil, but are reflected from the iris, giving it that brilliant appearance which it possesses. The contracted or dilated state of the pupil determines the quantity of these rays to be admitted through its aperture, and consequently

determines the degree of perfection with which pictures shall be formed upon the retina and choroid. It is this regulating power which the iris possesses, that adapts the eye to the perception of near or distant objects. If we wished to impress on the retina a picture at a considerable distance, and the pupil remain contracted, we shall be unable to effect that end. If, on the other hand, we wished to examine a very minute object, placed very near to the eye, and the pupil remain much expanded, we shall fail in obtaining a proper examination of such object. Some persons conceive, that the lens likewise possesses a similar property of changing its form and position in the eye, and have even led themselves to imagine that it has muscular fibres. That this may be true with regard to the lens is possible, but it appears to require still to be proved; and, while there is one plain and satisfactory way of accounting for these changes, it seems needless to look after another, which is exceedingly improbable, particularly as the lens possesses a property of a different kind. Others believe that the ciliary processes, by pressing upon the lens, cause it to modify the rays of light, so as to adapt the eye to the variations of different distances.

Another opinion is, that in looking at distant objects, the muscles compress the globe and elongate

it, as a telescope is lengthened. I cannot bring myself to believe that any such change takes place during the action alluded to, and consider that the dilatation of the pupil is the agent by which we change the eye from near to distant objects, whilst the muscles do no more than direct the ball to those objects. The change of the dimensions of the pupil is, at all events, an obvious and palpable change, whilst the presumed alterations of the lens and figure of the globe are but hypothetical, and do not admit of proof. I have noticed, in persons who have naturally a large pupil, that they are usually farsighted; and the contrary, that with a contracted pupil, particularly if combined with a small cornea, near sightedness exists. There may be other states of the eye which also contribute to those imperfections, such as a want of relation between the situation of the lens and the bottom of the posterior chamber, the distance of the latter not being in accordance with the focal distance of the former. I am inclined to think that this will be an occasional cause of imperfection of vision.

The rays of light then, passing through the cornea and aqueous humor, penetrate the pupil and enter the lens. The latter converges the rays at a given point beyond it (its focus), corresponding to the bottom of the eye, so that a very minute picture of an external object is represented, as it were,

on canvass, upon the choroid and retina. In this representation the retina, as before suggested, might be compared to a mirror, whilst the choroid answers to the quicksilver beneath; or the two, perhaps, more correctly correspond to a smoked glass, the choroid thus rendering the picture distinct upon the retina. It is well known that the picture in the bottom of the eye is always inverted, and many have been much puzzled to account for our seeing objects in the erect position, when they are represented in the eye in the opposite state. We must look back to the brain as the percipient power. It judges of the situation, form, and size of objects, from the combined information of the senses, and not from one in particular. Vision is only one of these senses, and by itself would be insufficient to convey to the mind distinct and well-defined ideas of external objects. So that we conclude, that the mere circumstance of the picture in the bottom of the eye being inverted, has nothing to do with its perception in the brain.

The perception of an object singly with two eyes has also excited much attention. The existence of double organs is a bountiful provision of the Great Author of nature. That we can and do exert both eyes, is as true as that we use both hands, and, like the hands, we may sometimes employ one eye more than the other, but it is doubtful if this is

generally the case. The eyes are differently situated to the hands: each of the former can be employed with the same facility, whilst both hands, oftentimes, cannot be used together. In proof that we use both eyes: if an object, say a pen in an inkstand, be steadfastly looked at, it will appear single; having shut one eye, and observed its exact position, open it and shut the other, and the pen will be observed at about an inch or so distant from the point where it was seen by the eye first used. What is remarkable in this experiment is, that the picture of the pen seen in the right eye will be the one situated to the left, and that by the left eye to the right. It seems certain, then, that objects are seen with both eyes. Some persons habitually see objects double, when not bulky, and if placed in outline, and when not looking fixedly at them; but by fixing both eyes steadily at any object it is seen singly. In attempting to squint, when both eyes are turned towards the nose, the circumstance is different,—the right eye then beholds the picture to the right, and *vice versa*. These conditions seem to depend upon a want of correspondence in the axis of the two eyes. Many other interesting points might be noticed, in regard to vision, but that they more properly belong to the science of optics.

Ophthalmitis. Inflammation of the globe.—Diseases of the eye, like those of other organs, are not always so clearly discernible, or so simple, when observed in the patient, as, from the regularity with which the symptoms are laid down in books, we might be led to suppose. Thus, instead of always finding pure conjunctivitis, iritis, or any other *itis*, we frequently meet with a combination of these. Sometimes, but this is very rarely the case, all the component parts of the globe are simultaneously affected. In this condition the *symptoms* common to external inflammation of the eye, in which the conjunctiva, cornea, and sclerotica are affected, are mixed up with those which attend internal inflammation of the retina, choroid, and iris. Hence, in addition to the enormous suffering, and great dread of light, which the patient often experiences in external inflammation, we have loss of vision, with a fixed and dilated pupil from the affection of the internal parts of the organ. Such a state of affairs must require a most prompt and efficient plan of treatment. That treatment must be of the most active antiphlogistic character, and if any portion of ophthalmic diseases require copious venesection, and nauseating doses of emetic tartar, this appears to be it, combined with the

other means proper for the reduction of internal inflammation.

In spite, however, of the most active treatment *Suppuration of the globe* is very apt to occur. Pus is formed in the interior of the organ; it may be seen passing through the pupil into the anterior chamber; ulceration of the cornea takes place, the matter is evacuated, and, with it, the humors of the eye. For this condition but little can be done. When suppuration is established, warm fomentations and the internal use of calomel and opium afford the greatest amount of relief. It seems doubtful if much good results from puncturing the eyeball, with a view to evacuate the pus; but, at the same time, no harm can follow such a practice. After suppuration and evacuation of the humors, the globe usually sinks back into the orbit, reduced to a mere tubercle.

Ophthalmitis interna. Internal inflammation of the globe.—As there is occasionally a condition of inflammation of all the structures of the globe, so likewise there is a state in which the internal parts are alone affected, the retina, choroid, and iris, whilst the coats of the eye remain free. This, it will readily be conceived, is a serious disease; but its management will be sufficiently understood,

from what is stated on the treatment of diseases of those parts. The condition of the retina and iris are to be more particularly noticed, and the means adapted to their diseased states rigidly enforced, especially the mercurial treatment.

Ophthalmitis externa. External inflammation of the globe.—Very frequently, also, we have to notice a condition of the eye which might well answer to this name, in which the true outer coats of the globe, the conjunctiva, cornea, and sclerotica, are simultaneously affected. Nothing, however, need be further stated in this place, but to refer to what is said on the inflammation of these separate parts, particularly as the circumstance of their being occasionally combined in that state will be there noticed.

Hydrophthalmia. Dropsy of the globe.—The posterior chamber is usually most affected in this disease. The vitreous humor is converted into a thin, watery fluid, and much increased in quantity, so as to distend the eyeball to a very considerable size, sometimes so much so, as to cause great uneasiness from the pressure of the coats of the eye and the palpebræ. The cornea is sometimes unaffected, but at other times opaque, and altered in form and size. This condition probably results from long continued, internal inflammation of the

globe, and is usually of such a nature as to destroy vision. Palliative treatment, such as the occasional application of leeches, counter irritants, &c. may be of service. The removal of the fluid, by puncturing the cornea, is sometimes practised with temporary relief, and it is often followed by a state of collapse. If the eye be very large, the same operation as for staphyloma may be had recourse to.

Varicose ophthalmia.—This is a dilated state of the vessels of the globe, which is often seen as a consequence of continued inflammation of its textures, and is generally observed in connection with amaurosis, or some other hopeless affection of the eye.

Exophthalmia or *proptosis.* — Protrusion of the globe between the lids, so as to prevent their closure. This is observed in bad cases of staphyloma, hydrophthalmia, fungus hæmatodes, tumors in the orbit, &c. It may be occasioned by accident, a sort of dislocation of the globe from the orbit. Instances of this have been related, where gentle pressure was effectual in causing a return of the displaced organ.

Atrophia oculi.—Sinking or absorption of the globe. This state occurs as a sequel of the more

serious diseases of the eye, particularly purulent ophthalmia, suppuration of the globe, or after the operation for staphyloma, &c. and sometimes from long continued internal ophthalmia, injuries, &c. When the result of chronic inflammation, it is often of slow progress, the eye shrinking gradually, and having a soft, flaccid feel, until it becomes reduced to a very small size. This state admits of no remedy but the adaptation of an artificial eye, which, when one eye only is lost, may be obtained to match the sound one in appearance, and worn with very little inconvenience.

OF THE MALIGNANT DISEASES OF THE GLOBE, CANCER, MELANOSIS, AND FUNGUS HÆMATODES.

Cancer oculi.—This disease usually commences in the palpebræ and conjunctiva, presenting an unhealthy kind of tubercle, which ulcerates and spreads from the conjunctiva to the globe. Sometimes the disease is confined to the globe, the palpebræ remaining unaffected. The textures of the eyeball become converted into a firm, cartilaginous substance, which ulcerates, and is followed by a sanious, fœtid discharge, with great pain and constitutional irritation, until the pa-

tient, worn out and exhausted with his sufferings, dies.

Treatment.—No remedy is of the least avail, except the knife; and extirpation is only proper where the disease is confined to the globe, the orbit and other contiguous parts remaining free. Upon the whole, there is not much to encourage even this, as the disease generally returns in some other part. If an operation be deemed unadvisable, then the only plan is to relieve the sufferings of the patient by every means in our power. The various narcotics, particularly opium, may be administered internally. The liquor opii sedativus, is an excellent local application, two or three drachms to an ounce of water, the strength of which may be gradually increased.

Melanosis oculi. — A soft, medullary, dark-coloured, fungous growth, usually proceeding from the interior of the globe, gradually pushing forward the lens and iris, and at length ulcerating through the cornea, with a gradual conversion of the whole of the globe into a livid, ulcerated mass of disease, accompanied with a discharge of a thick, dark, grumous fluid. This disease, like cancer, usually occurs in adults after the middle period of life. It is usually more rapid in its progress than cancer, and is often accompanied or followed by similar

affections in other parts of the body, as the brain, liver, &c. If there be reason to suppose that the disease is confined to the globe, extirpation affords the only chance; otherwise the treatment can only be palliative, by opiates, &c.

Fungus hæmatodes. Bleeding fungus, or soft cancer.—This disease, like the two preceding, is not peculiar to the eye, it being often found affecting other parts. It is usually met with in children, and is seldom seen in after life, although instances of it have been known. It is very similar in its progress to melanosis; but, when developed, is of a grey or red colour, and of medullary consistence, proceeding from the fundus of the globe, pushing before it the lens and iris, and ulcerating through the cornea, with bloody discharge. At its commencement, when confined to the bottom of the eye, it has a peculiar shining, metallic appearance, which becomes lost as the disease advances, from opacity of the lens in the next stage, and the general disorganization of the globe afterwards. Of course great irritation attends this formidable disease, which increases with the enlargement of the tumor, and which, combined with the bleeding, gradually exhausts the miserable sufferer.

No treatment can be of any avail here, except to relieve, by anodynes, the distress of the patient.

Extirpation seems to be abandoned, from the want of success attending it, the disease being always reproduced. It is said that, in some cases, the eye becomes atrophic and is absorbed, without destroying life. It appears doubtful if such cases were genuine fungus hæmatodes. In some instances the disease has made its appearance by the side of the globe, from the orbit, and has gradually spread to the ball. Occasionally the neighbouring glands enlarge, and are supposed to participate in the disease. When confined to the eye, it may commence in any of its structures, sclerotica, choroid, retina, or optic nerve.

Occasionally, a bright metallic appearance is observed in the bottom of the eye, after wounds or injuries, which may be mistaken for fungus hæmatodes. It is distinguished by the accident, by an absence of growth and irritation, and it generally is followed by atrophy.

Extirpation of the globe. — When it is thought advisable to resort to this operation, it may be practised in the following manner. The patient being in a proper position, the first part of the operation consists in making an incision parallel with the natural fissure of the lids, from the external angle to the temple, so as to give more room to get round the orbit. This being accomplished,

the separation of the globe from the orbit is effected by a double-edged scalpel being carried all around it. It is usual to commence at the lower portion. Having separated it at that point, by cutting through the conjunctiva and inferior oblique muscle, a similar process is to be effected at the upper portion, by detaching the superior oblique and dissecting the rest of the conjunctiva from the globe. The scalpel is then carried all round and to the bottom of the orbit, taking care to remove the whole of its contents, and to divide the optic nerve as far back as possible. As a matter of precaution, it is as well to remove the lacrymal gland also. There is generally considerable bleeding from the ophthalmic artery, but it is easily stopped by a compress of lint. After the bleeding has ceased, the wound of the external commissure must be brought together, and the patient treated as for a wound elsewhere. It was formerly the practice to fill up the orbit with lint, &c. but this is now abandoned, as being more likely to do harm than good.

OTHER AFFECTIONS OF THE GLOBE.

Simple fungus. — Fungous growths sometimes arise from the conjunctiva, cornea, sclerotica, iris, and occasionally from the orbit. Sometimes they

are innocent in their nature, and, when growing from the conjunctiva, or cornea, are easily removed. When they arise from the iris, they may penetrate the cornea or sclerotica, and cause much irritation, and sometimes absorption of the globe. Occasionally, it is deemed necessary to remove the whole of the contents of the orbit, although not malignant, to get rid of the deformity and irritation consequent upon these fungous growths.

Nyctalopia. Day blindness.—In certain irritable states of the eyeball, individuals are unable to bear the light of day. This may be said to be more or less the case in every inflammatory condition of the organ. We observe it more particularly in strumous ophthalmia: in these diseases the patient cannot endure the full light of day; but place him in a dark corner, and he can use the eye freely enough. Occasionally, however, this is observed without any inflammation being present, and here the term nyctalopia is applied. It is an irritable state of the organ generally, and seems to me independent of affection of the retina, although it is customary to consider it as something related to amaurosis. It probably results from some excitement, either in the brain, or the fifth pair of nerves, the source of sensibility to the eye. I have lately seen a case of this affection in an elderly female, in

whom there was not the slightest alteration in any of the structures of the organ, the disease being purely functional, and consisting simply of morbid sensibility to light. The function of the retina was unaffected, vision being quite good when in a rather dark place. Persons with a fixed and dilated pupil are somewhat nyctalopic.

Hemeralopia. Night blindness.—In this state the patient can see well enough in the full light of day; but, as night approaches, fails in distinguishing objects, and can see little or nothing in a dull light. This affection is seldom observed except in tropical climates, where the eyes are exposed to the glaring light and burning heat of a vertical sun. It seems certain, therefore, that this exposure is connected with the production of this condition of the eye. May not the intense light and heat be productive of a morbid irritability of the eyeball, which shall cause a powerful contraction of the pupil, and which may be unable to dilate itself in the evening, a condition necessary to perfect vision at that period? This seems more probable, from the fact that persons having a very small fixed pupil, are always in this condition. As in the opposite state, previously noticed, this disease is also considered to depend upon an affection of the retina, which I consider to be somewhat doubtful.

The treatment recommended is that of purgatives, with blisters to the temple, which are represented as being effectual in removing it.

Strabismus. Squinting.—In this condition of the eye, it is usually turned inwards towards the nose. Sometimes one eye alone is affected, at others both participate. This state must arise from paralysis of the sixth pair of nerves, the origin of the motor power of the abductor muscle of the eye, whose action is lost or impaired in this condition. The frequency of it is not surprising, when the delicacy of that nerve is considered, as well as the relations it has with the great sympathetic, hence its frequent disturbance in diseases of remote parts. So that in the consideration of its treatment we are led to trace, if possible, its connection with some irritation elsewhere, as in the stomach and bowels, and by removing the source of that irritation, we may perhaps effect the recovery of the power of the abductor. Whether we can remedy this condition or not, it is desirable to be possessed of right views of the subject, as the most likely to lead, at some future time, to a discovery of its proper treatment. At present, every plan of treatment often fails in removing it. Binding up the sound eye, and thus calling into greater action the squinting one, is

often recommended, and very often fails, but is perhaps worth a trial. If it depend, as it most probably does, when not removed by purgatives, &c. upon paralysis of the sixth pair of nerves, it will be seen that none of the remedies usually recommended can be of the slightest avail.

Sometimes the direction of the eye is turned permanently outwards. This must arise from diminution or loss of power of the other straight muscles of the eye, and must be traced to some irritation or paralysis of the third pair of nerves, either in the orbit or at their origin in the brain. Here the external rectus has the mastery of the other muscles. In total paralysis of the third pair, we should also find the levator palpebræ useless, and the iris motionless. The treatment of this case must be regulated by its presumed origin. It seems doubtful if strabismus be simply the result of habit.

Myopia. Nearsightedness.—I have already stated my opinion, that this condition is owing chiefly to the size of the pupil. The circumstance of its existence in persons who are constantly employed in looking at near, or minute, or shining objects, in which state the pupil always contracts itself, and, by frequent practice becomes, as it were, habituated to this contracted state, and loses its power of efficiently dilating itself, seems to confirm this view

Individuals who write or read much are similarly affected; whilst sailors, soldiers, and persons who are constantly on the look out for distant objects, are observed to be free from this imperfection. Whatever may be considered the condition on which nearsightedness depends, the remedy is found in the use of a concave glass before the eye, which enables it to see objects at considerable distances. In looking at remote objects the pupil always dilates, and the eyelids separate to collect the rays from the distance. In nearsighted persons this is not sufficiently effected. The concave glass remedies this defect, by collecting the more distant rays, and by converging them, allows their entrance into the pupil. Many nearsighted individuals can see objects at a little distance better in the evening, from the expansion of the pupil, than in open day: but persons who have the pupils nearly closed and fixed, although they may see pretty well in the day time, are unable to find their way in the dusk, being nearly blind from inability to dilate the pupil.

Presbyopia. Farsightedness.—This is the opposite condition to myopia. Some individuals are able to see objects at considerable distances with distinctness, but find it difficult to discern near objects. To this state the name presbyopia is given. It is attributable to a want of proper contractility

of the pupil, a process which always takes place in changing the eye from a distant to a near object. The opposite kind of glass, viz. the convex, is suited to this condition for reading or looking at any near or small object, which has the property of representing these objects more distinctly, which it does by diverging the rays of light.

Malformations. — In addition to deficiencies or malformations of individual parts of the globe, instances are not wanting of a total absence of the eyeball. I have seen two individuals so circumstanced: they were sisters, both children. Other instances are recorded by foreign writers.

CORNEA.

Structure. — The cornea is the anterior, transparent portion of the solid texture of the globe, of which it constitutes about one sixth portion. With the sclerotica it forms the firm dense capsule or coat, which surrounds and encloses the more delicate and essential parts of the optical apparatus. It is intimately united with the sclerotic coat, so much so, that formerly it was considered to be a continuation of it, and was not believed to differ from it in anything but transparency, — hence the

one was termed *cornea opaca*, the other *cornea lucida*. It is now generally described as a separate texture. Forming internally a concavity for the reception of the aqueous humor, it presents a convex shape externally, its marginal circumference, where it adheres to the sclerotica, rather approaching to an elliptical form, the transverse being somewhat its longest diameter. The corneal structure is usually divided into three portions, the *external* or conjunctival, the *central* or proper cornea, and an *internal* one, considered as the membrane of the aqueous humor. The outer covering of the cornea presents a very smooth and highly polished surface, and probably secretes a lubricating fluid similar to the true conjunctiva, which contributes to its glistening and brilliant appearance. It is very thin and delicate, and easily separated from the proper cornea, as is seen in dislodging foreign substances, when it is readily abraded with the instruments used for that object. From the freedom with which the vessels of the conjunctiva, in a state of vascular excitement, pass on to the outer covering of the cornea, it seems evident that it is but a continuation of that membrane. The proper cornea, lying under its cuticular or conjunctival covering, is much firmer and more dense, partaking of the fibro-cartilaginous structure. It consists of numerous laminæ, or separate portions lying on

each other, something like the layers of an onion; between these a portion of cellular texture is found, which contains a minute quantity of fluid, the turbidity of which is supposed to give that dull, opaque appearance to the cornea, which is observed after death. It may also be concerned in producing the muddy appearance observed during a state of disease.

The inner portion of the cornea, or membrane of the aqueous humor, is also of a firm, cartilaginous structure. This is supposed to be a serous membrane, and to secrete the aqueous humor.

Use.—From its central position, convex form, and transparent texture, it is admirably adapted first to collect, and then transmit the rays of light into the interior of the organ: whilst from its strength and compactness it forms an excellent defence to the internal and delicate contents of the globe, more particularly the aqueous humor, iris, and lens.

DISEASES OF THE CORNEA.

Corneitis. Inflammation of the cornea.—It is very rare that we meet with inflammation confined to the cornea, the neighbouring parts usually participating, particularly the conjunctiva and sclerotica.

Symptoms.—The cornea presents a dull, hazy appearance; sometimes an infinite number of minute ulcers are visible, occasioning an irregular uneven surface; red vessels are occasionally observed about the margin of the cornea; the conjunctiva and sclerotica are often much injected, the latter more particularly, the vascularity of which is seen under the conjunctiva, with its pink vessels, particularly around the margin of the cornea, in the form of a zone; pain in the eye and forehead, and other symptoms, arising from irritation, such as intolerance of light. The latter symptom is often a prominent one, when there is considerable opacity of the cornea, and consequently when much less light than usual can get into the eye, to affect the retina; another proof that light acts as a direct irritant to the external parts of the organ. More or less opacity soon follows, sometimes external, sometimes intermediate; and I have seen a most distinct appearance of opacity of the internal membrane, with a perfect transparency of the other textures in that particular portion of the cornea, — the whole three textures being similarly affected in different portions of the cornea in the same eye.

Causes.—It is frequently the result of injury, such as pieces of metal, or other sharp substances projected against the cornea; but it may also arise

from other ordinary causes, and often attends strumous ophthalmia.

Treatment.—If it be produced by accident, it will be necessary to ascertain if any particle of matter be still embedded in the cornea; when this is the case, it must of course be immediately dislodged, which is easily accomplished with a lancet, or other finely pointed instrument. If the inflammation be but slight, a cloth laid over the palpebræ wet in the saturnine lotion, with some gentle aperient medicine; if more severe, the application of leeches, venesection, counter-irritation, &c. will be effectual in reducing it. It will sometimes be requisite to have recourse to the use of mercury internally; but this is more necessary when the disease arises from other causes, particularly when it assumes a more chronic or subacute form, as it often does in females, or young persons of a delicate or strumous habit. When the inflammatory stage is subdued, and opacity or ulceration remains, some stimulant applications will be required.

Abscess of the cornea.—During the progress of inflammation, sometimes pus is deposited in the lamellated texture of the cornea; it is very apt to occur in strumous subjects. The matter is generally absorbed, or, ulceration occurring, an exit is

made through the layers of the cornea, either externally or into the anterior chamber, which latter state is termed *hypopion*. When confined to the internal laminæ, it is said to gravitate to the margin of the cornea, when it receives the name of *onyx* or *unguis*, from the shape it assumes: this seems to be an unfounded supposition; a similar appearance, however, is represented in the case of hypopion. I have seen instances where punctures have been made for its evacuation, but the matter, when in the texture of the cornea, is usually too tenacious to escape readily. Reduction of the inflammation is the point to be aimed at, which effected, the matter will become absorbed.

Ulceration of the cornea.—This condition of the cornea is the result of inflammation, sometimes of a low, inactive, at other times of an acute and more violent character; with the symptoms of which it is therefore generally combined.

Treatment.—If the inflammation be severe, it must be actively treated in the manner before described.

If the ulcer be of a superficial kind, and not very extensive, it may be left to itself; as the inflammatory action subsides, it may be expected to heal. If this be dilatory, or if the ulcer spread, or be attended with a dirty, irregular appearance, the

application of a local stimulus will be needed; to effect this, we may inject over its surface a solution of alum, zinc, copper, or nitrate of silver, according to the strength of the application deemed necessary; or we may apply the pencil of the nitrate of silver to the ulcerated surface. Sometimes it is necessary to combine the antiphlogistic and stimulant treatment. Where inflammation of an active description coexists with an ulcer of a sloughy character, or occupying some extent of surface, or threatening to penetrate the anterior chamber, leeching or venesection may be followed by the application of the nitrate of silver. In such a case as this, there is great danger to the eye. The coats of the cornea frequently give way, the aqueous humor escapes, the iris and cornea are brought into immediate contact, perhaps a portion of the iris passes through the aperture of the cornea, and stops it up *(prolapsus iridis)*. In this state adhesive inflammation is set up, the strangulated portion of the iris is agglutinated to the cornea, and thus further evacuation of the aqueous humor is prevented, and the anterior chamber is again distended, although perhaps considerably diminished in extent. The protruded portion of the iris is to be touched daily with the nitrate of silver pencil, or, according to some, to be excised with scissors, so as to take off its rough surface, which will be

otherwise a source of irritation. After the perfect healing of the ulcer a dark appearance is observable, where the iris adheres to the cornea, and this state often changes materially the form of the pupil, dragging it towards the ulcerated part; but still the vision may be unimpaired. A still worse state of things may arise. The ulcer may be sufficiently large to allow of the escape of the lens, and a portion of the vitreous humor, followed by collapse and atrophy of the globe. As has been observed elsewhere, this is a frequent result of ulceration of the cornea, attending purulent ophthalmia.

Opacity of the cornea. — This is commonly the result of the previously mentioned diseases of the cornea, inflammation and ulceration; but they are not necessarily followed by opacity. Many cases of inflammation will occur, without leaving a speck behind; and I have seen ulcers of considerable extent, where not the slightest opacity has been left; but this is rather the exception than the rule. It is not always a product of diseased action; in elderly persons it is very common to observe an opacity extending all round the margin of the cornea, probably from impaired action of the secerning vessels, which may deposit a firmer substance than the fluid usually found in the cellular

texture of the laminæ of the cornea. This is called *arcus senilis.*

Treatment.—If there be any inflammation, either of the cornea or other tunics, conjoined with the opacity, the first object will be its removal, which must be effected in the manner previously laid down. Care must always be taken to examine the conjunctival covering of both eyelids. If there be any irregularity, anything in the shape of granulations, or chronic inflammation, no good will be effected until this state is remedied. Another frequent cause is turning in of the edges of the lids *(Entropion)*, or of the cilia *(Trichiasis)*, which must be remedied in the manner elsewhere mentioned. If, then, all sources of irritation are removed, some gentle stimulant must be applied to the diseased surface; something in the form of drops is usually had recourse to, viz. a solution of the argent. nitrat. or of oxymuriate of mercury (two to four grains to the ounce of water). The former must not be persevered in too long, as it is apt to leave a permanent stain of the conjunctiva, causing a disagreeable dark olive tint; and as probably the other will answer as well, it is not advisable to run this risk. This effect of the nitrate of silver however is not often observed, as in many hundreds of cases in which I have seen it used, I do not remember to have noticed it in more than

three or four instances. A particular kind of opacity of the cornea has been observed to follow the use of lead in the stage of ulceration. It was first noticed about the same time by Dr. Jacob,* of Dublin, and Mr. Windsor,† of Manchester. The lead, undergoing some chemical change, becomes deposited in the excavation of the cornea, forming an insoluble precipitate of lead, which adheres permanently to its texture. Hence it is desirable to avoid the use of lead applications in ulcers of the cornea, as they might otherwise heal without any particular opacity. I have seen many well-marked instances of this. A dark coloured opacity is said to be occasioned also by a similar use of nitrate of silver. Other applications, such as a powder of calomel, sugar, &c. blown into the eye, the vinum opii, &c. are also used for the purpose of promoting the absorption of the opaque matter from the cornea. If the opacity be not very extensive, only in specks here and there, or, at the most, superficial cloudiness *(nebula)*, these applications will often lessen or disperse them: if, on the contrary, it extend deep into the texture of the cornea, or cover a considerable portion of its surface *(albugo* or *leucoma)*, then we may scarcely expect to influence such a condition with our remedies.

* Dublin Hospital Reports, vol. v. p. 371.

† Lancet. Dec. 25, 1830.

Conjoined with these stimulating applications, issues or setons, in the temples or nucha, are frequently productive of benefit, particularly if there be chronic inflammation of the other tunics.

If the opacity be so situated as to exclude light from entering the eye, preventing the patient from enjoying any useful vision, and a portion of the cornea still remains transparent, it will then become a question, whether an *artificial pupil* may not be formed in the iris beneath.

Vascular cornea.—A chronic, vascular state of the cornea sometimes remains after inflammatory attacks, in which the cornea and other tunics may have participated: it is often attended with a similar condition, or perhaps that of granulations, of the conjunctiva; if the latter state be remedied, the cornea will become improved. For this purpose, the use of stimulants is generally found necessary. Sometimes the excision of the vascular portion of the conjunctiva, by cutting off its supply of superfluous vessels, will be attended with the happiest effects, the cornea resuming its healthy appearance.

Staphyloma of the cornea.—This consists in an unnatural projection of the cornea, with alteration of its form; sometimes presenting a conical, sometimes a spherical shape, with opacity and loss of

vision. It is a frequent termination of purulent and other violent inflammations of the eye, and is more particularly observed in children, but not unfrequently also in adults. It is generally attended with more or less enlargement of the posterior chamber, with effusion of an aqueous fluid in the room of the vitreous humor, or which latter is, at all events, altered in character. Usually there is considerable disorganisation of the various structures of the eye, the cornea and iris being generally in contact, and the anterior chamber obliterated.

Treatment.—If no irritation exist in any part of the eye, interference will not be required. If, on the other hand, the cornea protrudes so far as to prevent the closure of the palpebræ, there will generally be a state of irritation set up, which occasions considerable suffering to the patient, and may endanger the other eye (if it exist). This is sometimes a source of great annoyance, frequently recurring and disappearing, until at length the sufferer is wearied, and he seeks for assistance. An operation for the removal of the projecting portion is then advisable. It is effected as follows. A cornea knife is pushed transversely through the cornea, just anterior to its junction with the sclerotica, which is made to cut its way out in a downward direction: the flap is then laid hold of with a pair of forceps, and a circular portion is excised

with scissors. The eyelids must be separated in the usual manner, with the aid of an assistant, whose province it is to take the command of the superior one. This proceeding occasions an entire subsidence of the globe, the remaining humors flow out, and the flaccid tunics shrink into the orbit, and generally no further trouble ensues. After this operation, it is proper that the eyelids should be kept closed for a few days, so as to prevent irritation. This is best effected by a strap or two of adhesive plaster passed over the eyelids, and secured on the brow and cheek; or, according to the practice of some, a bandage may be passed over them, and round the head, with the application of a wet rag, dipped in water or saturnine lotion. Occasionally, however, this operation is followed by considerable inflammation, the wound of the cornea is closed up by adhesive matter, fresh fluid is secreted, and the globe becomes distended, as large, or larger than before. I recollect a case of this description, where the patient's sufferings were extreme for several weeks. It became necessary to apply leeches in considerable number to the eyelids, which were enormously swollen, and fomentations and other warm applications. It appeared at one time as if suppuration of the eyeball would have followed. I passed a lancet into the tumor, but no matter escaped. It gradually diminished, and, in

a few weeks afterwards, had got to about the size it occupied previous to the operation, when I lost sight of the man. I have since seen similar cases, but in all the termination has been in complete subsidence of the tumor.

Partial staphyloma may sometimes be arrested by the regular application of the nitrate of silver to the projection of the cornea.

Conical cornea.—In this state the cornea becomes changed from its regular spherical shape into a projecting cone, the apex of which is the centre of the cornea; an alteration which materially injures vision, producing nearsightedness. This state is probably the result of some slow progress of absorption, by which the central portion of the cornea yields to the pressure of the contents of the globe. I have seen this actually demonstrated, after death, in the eye of a person who had this affection when living, the projecting portion of the cornea being very much attenuated. No treatment is as yet known to influence this state of the cornea. Some optical contrivance may perhaps be of use. In the cases I have generally seen, it has been confined to one eye, so that in this instance persons will not take the trouble of using any apparatus. Concave spectacles will be

found to improve vision to a certain extent. It has been proposed to remove the lens, so as to diminish the effects of the excessive refraction of the rays of light.

Fungous growths from the cornea are sometimes seen. They are usually of an innocent character, and may be removed with a sharp and slender scissors, the excrescence being first laid hold of with a small pair of forceps. If they are reproduced, the nitrate of silver may be applied to repress their growth. They are generally small and attached to the margin; but Mr. TRAVERS describes a case, in which the whole of the cornea was buried under an immense fungous growth, which he removed.

Wounds, if confined to this part of the organ, are not often very serious; but they may sometimes leave an opacity when seated over the pupil, which may injure vision.

Treatment.—Repose of the organ, leeches and cold applications, with purgatives, according to the degree of inflammation resulting. Securing the eyelids, when closed, with strips of Court-plaster is a very effectual way of contributing to the quietude of the part, and preventing that friction that will otherwise take place between the edges of the

wound and the inner surface of the palpebræ. If the entire substance of the cornea be penetrated, the aqueous humor will escape; this however will be soon reproduced. The iris may protrude as in ulcers of the cornea. The remarks made under the head of inflammation and ulceration of the cornea, will apply to these states.

Malformation.—A state has been mentioned, in which the sclerotica has encroached upon the cornea, to such an extent, that the latter scarcely exceeded the diameter of the pupil. This was congenital, attended with amaurosis.

THE SCLEROTICA.

Structure.—The sclerotica is the firm, fibrous texture which encloses and defends the largest portion of the contents of the globe, more particularly the delicate nervous expansion—the retina, the choroid, and vitreous humor. It constitutes five-sixths of the solid case of the globe, the remaining portion being completed anteriorly by the transparent cornea. Like the cornea, the anterior portion of the sclerotica is covered by the conjunctiva, but is not so intimately united to it as to the former; the one lying loosely with cellular texture intervening, the other firmly adherent, so

as to constitute an integral portion of its structure. In shape it is similar to the cornea, convex externally and concave within, both forming nearly a sphere; not so firm but more elastic, and is pretty nearly opaque.* Its colour is a faint white, approaching to blue, and from this circumstance it has received the name of *tunica albuginea*. This is accounted for by the absence of red vessels, which do not enter into its composition in a state of health. Commencing at the cornea, with which it is firmly connected, it passes entirely round, and encloses that portion of the eye called its posterior chamber. At its central and posterior portion it is perforated by the optic nerve, as well as by the ciliary nerves and vessels, where it is considerably thicker than at its anterior portion. It is into the sclerotica, externally, that the muscles of the eye-ball are inserted, where it is rough, so as to adapt it for this purpose. The inner surface, which is smooth and moist, is attached to the choroid by loose cellular substance.

Use.—Its chief use is to give support and protection to the parts which it surrounds. It has nothing to do with vision, being merely a case for the reception and safeguard of the more essential portions of the organ.

* Quere. Would it be sufficiently so to exclude light from penetrating the posterior chamber, if it were not lined with the choroid?

DISEASES OF THE SCLEROTICA.

Sclerotitis. Inflammation of the sclerotic coat.—Rheumatic ophthalmia.—After inflammation of the conjunctiva has continued for some considerable period, a similar action is generally found to extend to the sclerotica, usually commencing around the margin of the cornea, in the form of a zone of vessels. This is accounted for by the circumstance of the vessels of the conjunctiva passing at this point to the sclerotica,—so that here there is an intimate vascular connection between the two tunics. Ordinary inflammation of the sclerotica is therefore but an extension of the diseased action from the conjunctiva. Now and then, inflammation of the sclerotica is observed as an original affection, and then its vascularity is very considerable, whilst that of the conjunctiva is but slight. The vessels of the former pursue a straight course to the cornea, and are of a rose pink colour; whilst those of the latter are irregular in their direction, and of a bright red or scarlet appearance. The zone formed by the pink vessels of the sclerotica, surrounding the cornea, has been before mentioned. Sclerotitis, in this form, is rather a rare affection, which is accounted for from the structure of the membrane, its properties, and situation, resembling the other fibrous struc-

tures of the body, in not readily taking up diseased action, and protected from external agencies by its conjunctival covering and situation in the orbit. When, however, inflammation once arises, it is much less under the influence of remedies than the same condition of the other structures of the eye, and hence it is often tedious in its progress, and by extension to the cornea and iris, frequently occasions them to become more or less altered in structure and function. Inflammation of the sclerotica very often either attends or follows rheumatic inflammation in other parts, from its similarity of structure to the parts usually affected with this form of disease. It is also frequently an accompaniment of gonorrhœal inflammation. In addition to the altered appearance of the sclerotica, there is generally a dull, obtuse pain, with feeling of tension in the globe, intolerance of light, and an increased flow of tears, in proportion to the degree of vascularity and febrile excitement.

Treatment. — The activity of this must depend on the severity of the attack. If the inflammation be acute, with febrile symptoms, venesection will be requisite; if less severe, the local abstraction of blood by cupping the temple, or leeching the eyelids, may be an effectual relief. Next to the abstraction of blood, mercury is perhaps the most effectual remedy, particularly if the iris or cornea

should participate in the disease. If there be nothing in the state of the patient to prohibit such a proceeding, it may be used so as to affect the mouth. A combination of opium with calomel is generally proper, and relieves the pain. Other remedies used in rheumatic inflammation, such as antimony, ipecacuanha, and particularly colchicum, are also proper as auxiliaries. Warm fomentations are considered the best local applications. Counter-irritation to the temples, or back of the neck, by blisters and tartar emetic ointment, is often serviceable.

Catarrho-rheumatic ophthalmia is an extension of the conjunctival inflammation, in catarrhal ophthalmia, to the sclerotica. The treatment must be more active than in simple catarrhal ophthalmia, and as it may approach in severity to the disease just spoken of, so it must be attacked by more powerful remedies.

Staphyloma scleroticæ. — As a result of continued inflammation, we sometimes find the sclerotic become attenuated from absorption, so as to allow the choroid to be visible beneath its surface, or to push it forward and produce a blue, or darker coloured tumor (the staphyloma), which sometimes projects very considerably. It appears somewhat like a hernia, the covering being the attenuated

sclerotica, the contents formed by the bulging of the choroid. I have seen tumors of considerable size, as large as a mulberry, on both eyes, the patient being able to follow some trifling occupation. Usually, in such a condition, vision is very imperfect, from the retina participating in the diseased action. For this state no treatment seems likely to be of any avail. Mr. Mackenzie, however, has reported cases of this description, in which he states, that considerable benefit was derived from the use of arseniate of potash, one thirty-second part of a grain, thrice a day, at the commencement.

Wounds, in which the sclerotica is much injured, are generally attended with great local and constitutional disturbance. Resulting often from severe blows, the retina, iris, and lens, are often simultaneously injured; and great irritation and violent inflammation usually succeed. The inflammation must be combated by the most active means, otherwise suppuration of the globe may be the consequence. Division of the sclerotica is said never to unite, not even the simple puncture from a needle. I have seen instances of union after very severe injuries.

THE CHOROID.

Tunica choroidea, or *vasculosa*.

Structure.—This membrane consists of an entire vascular network, consisting of blood-vessels, which secrete the dark matter, called *pigmentum nigrum*, or *fuscum*. The name of tunic is apt to convey an erroneous idea of the nature and uses of this delicate structure: so far from being a covering or defence for anything else, it requires, as much as any part of the organ, to be defended from external influences. It forms a soft nidus or bed for the expansion of the nervous matter, called the retina. It lines the inner portion of the sclerotica throughout its whole extent, and is connected to it by loose cellular threads. Like the sclerotica, it is perforated by the optic nerve.

The secretion, called its pigment, seems to pervade the whole structure of the choroid, staining even the sclerotica with its dye, but is easily separable, and by washing or macerating in water may be completely removed. It is throughout of a dark brown in the human eye, differing from animals, in whom it is black, and in part variegated, so as to receive the name of *tapetum*. In animals, also, a separate membrane was discovered by Ruysch, lying upon the tapetum, called after him, *tunica*

Ruyschiana, but it is not demonstrable in the human eye.

Externally, at its anterior extremity, and just under that portion of the sclerotica where it is joined with the cornea, the choroid presents the appearance of a white ring, called *annulus ciliaris*, or ciliary ring or ligament. Some have described it as a separate body, considering it as a common bond of union between the choroid and retina posteriorly, and the cornea and iris anteriorly. It is more firmly adherent to the sclerotica than any other part of the choroid. Internally the choroid presents a uniform appearance, until it approaches near to the point under consideration: here is seen an irregular line (or *a serrata*), anterior to which the membrane presents the appearance of a number of folds, alternately black and white, these are called the *ciliary processes*, and extend to the circumference of the lens. The whole of this portion of the choroid is termed *ciliary body*. The pigment upon it adheres more firmly than on the other parts of the choroid.

Use.—The choroid membrane seems to be chiefly of use in secreting the dark pigment, which is essential to the perfection of the optical apparatus. It seems to form a thick varnish or paint to line the posterior chamber, a dark ground being necessary for the perfect representation of objects in the

bottom of the eye. Occasionally the pigment is wanting, communicating to the eye a reddish appearance, such as is seen in the white rabbit, &c.: such individuals are called Albinos; their vision is somewhat imperfect, and is much confused in a strong light.

DISEASES OF THE CHOROID.

Choroiditis. Inflammation of the choroid.—Some writers have set down an affection of the choroid under this denomination. From the extreme vascularity of this membrane, there can be no doubt that it is susceptible of inflammation; but that it is ever seated in it exclusively, does not seem quite so clear; and as so little is known about it, we come to the conclusion, that simple choroiditis must be a rare affection. It may exist, however, in a state of combination with inflammation of the sclerotica, or of the retina and iris, the state called internal ophthalmia. The little vascular communication it has with the sclerotica, which seems to be placed as a barrier between it and external disease and injury, is sufficient to account for its comparative immunity from these,—the firm, fibrous structure of the sclerotica seeming effectually to forbid

the transit of morbid excitement to the membranes beneath: so that it is very rare to witness internal inflammation proceeding from common inflammation of the conjunctiva or sclerotica. Simple inflammation of the choroid, if it could be proved to exist, would require no difference of treatment from inflammation of the other internal parts of the organ.

Wounds of the choroid, or its ciliary body, are generally attended with considerable hæmorrhage into the chambers of the eye. This will generally become absorbed after the irritation subsides. As such a state will often be combined with severe injury of other parts of the globe, such as the sclerotica, iris, lens, and retina, there will often be violent inflammation of the globe. This must be subdued by the means elsewhere pointed out.

An *ossification* of the choroid has been observed as a result of morbid action.

THE RETINA.

Structure.—The retina is the delicate, nervous structure, which is expanded in the form of a thin membrane upon the choroid, and placed between it

and the vitreous humor. The optic nerve perforates the sclerotica and choroid in the bottom of the orbit, and then branches off in this thin gelatinous substance all round the inner surface of the choroid as far as the ciliary body. It does not seem to adhere to either of these surfaces, but is simply placed in juxta-position with them. In the natural state it is perfectly transparent, but soon ceases to be so after death, or in consequence of morbid action.

A small foramen or depression is observed on the outer side of the entrance of the optic nerve, with a yellow border, which is called *macula lutea*. Near this is seen the *arteria centralis retinæ*, which affords a supply of blood to the retina. The substance forming the retina may be easily divided into its medullary or nervous, and reticulated or vascular structure: the latter is situated between the medullary matter and vitreous humor. A very thin delicate membrane is also described as lying between the medullary portion of the retina and the choroid, and has been named *tunica Jacobi*, from Dr. Jacob who discovered it.

Use. — The retina is designed to receive the impress and form of the different external objects presented to it by the optical arrangement of the eye, and which are from it conveyed to the brain by the optic nerve. It is usual, also, to consider

the retina as peculiarly the seat of sensibility to light: — thus when the iris fails to contract on an increase of the stimulus of light, it is said to be from want of sensibility in the retina; in inflammation of the conjunctiva, if there be intolerance of light, it is said to be from the retina sympathising with the external irritation. This view I believe to be erroneous, as I have elsewhere endeavoured to prove. The particular portion of the retina, at the entrance of the optic nerve, appears to be incapable of receiving impressions from visible objects, a fact which certain experiments seem to prove.

DISEASES OF THE RETINA.

The retina, like other nervous structures, is very liable to be the subject of diseased action, both independently, and in conjunction with a similar condition of the neighbouring parts, the iris, choroid, and sclerotica, more particularly the former. It also frequently sympathises with a morbid condition of some more distant part. Its influence may likewise be injured or destroyed, by disease affecting its parent nerve, or by some affection seated in the brain itself. Probably the most fre-

quent state of disease in the retina is that, which is the most common attendant of disorder, in most other structures, namely, increased vascular action, inflammation, and its consequences. Sometimes, however, it seems well ascertained, that the functions of the retina may be suspended or annihilated, without derangement of its vascular structure, the state termed paralysis. This impaired state of the retina, from whatever cause it may originate is termed *amaurosis*. It may either be complete or partial, active or passive; and not unfrequently congenital, or even hereditary.

Retinitis. Inflammation of the retina. — Active amaurosis. — Increased vascular action of the retina may vary in extent and severity, from simple turgescence or congestion to the most active inflammation, which may be followed by deposition, or change of its structure, opacity, and even ossification, as is seen in some of the other textures of the eye, but which is not so visible here. It frequently arises suddenly, proceeds rapidly, and may destroy vision in a very brief period.

Symptoms. — The most important of these, and the one which first and most forcibly strikes the attention of the patient, is impaired vision, which may exist in various degrees, from slight dimness and obscurity, to complete and total blindness.

Frequently, also, pain is complained of, deep in the orbit, sudden and severe, darting into the head and neighbouring parts, with a sense of confusion and giddiness of the brain. This, however, is by no means a constant attendant, as in the worst cases, there is sometimes a total absence of suffering, particularly after the disease has existed some little time. Flashes of fire, and objects sometimes black, like flies *(muscæ volitantes)*, at others red, sparkling, and variegated, are seen floating before the eye, with confusion and change of form in surrounding objects. On looking into the pupil we often observe, instead of the natural shining or brilliant black, a dull lack-lustre appearance, sometimes approaching to a grey colour, with an inactive, sluggish, or motionless state of the iris, frequently accompanied by a change in the shape of the pupil, which is oval or still more irregular. The pupil is not always dilated, particularly at the onset of the disease, or in the case of one eye only being affected, the iris often sympathising with the free action of its fellow. The impaired function of the iris is to be attributed to the extension of the diseased action to its structure; or from the ciliary nerves participating in, or being paralysed by, the inflammation of the contiguous membrane, the choroid, which we can hardly conceive to escape, when there is any active disease of the retina. In the

early stage there is sometimes intolerance of light from the excited state of the organ, and occasionally this is the case in confirmed amaurosis, but more frequently in the latter, light makes no impression upon the eye, the patient not being able to discriminate between light and darkness.

Causes. — Frequent instances occur of active amaurosis arising suddenly without any perceptible cause. Often it may be traced to direct causes, such as flashes of lightning; exposure to blazing lights and large fires; excessive use of the organ, particularly on minute or brilliant objects; intoxication, and general free living. More indirectly the cessation of menstruation, suppression of hæmorrhage or other discharges, &c.

Treatment. — In the commencement very active measures must be resorted to, and those of an antiphlogistic kind. We must bleed largely from the arm, *ad deliquium*. This must be repeated, in a short time, if no improvement takes place. Cupping, leeches, brisk purgatives, and counter-irritation must follow, in quick succession, if we desire to check the progress of the affection. A pretty rapid use of mercury, so as to affect the mouth in a short period, or until the symptoms improve, is an essential part of the treatment of this disease. Perhaps this is the most important remedy. It should be used promptly and ener-

getically, so that ptyalism be produced, with as little delay as possible; when a restoration of the functions of the retina generally succeeds. A state of rest, with light diet, is to be advised, and the organ protected from light and other irritants, such as cold air, &c.

If the attack be slight, and the symptoms partial, or the patient feeble and delicate, the principle to act upon is still the same, but must be more cautiously and moderately put into practice. Here a smaller bleeding, perhaps a few leeches, with purgatives, counter-irritants, and a mild course of mercury must be adopted, with an attention to the general health, or other circumstances that may arise.

Chronic amaurosis. — This condition may arise from neglect or improper treatment of the active, inflammatory state previously spoken of, but it also frequently comes on insidiously, without any striking symptoms.

Symptoms. — When it arises without being attended by the active condition just mentioned, there is usually a gradual failing of sight. Objects at first appear misty and confused, running one into another, sometimes only parts of them being discernible. There is seldom much pain in the organ, but giddiness and uneasiness in the head

are often complained of, either attending or preceding the disturbance of vision. Other symptoms before spoken of, as being present in the active form of the disease, also present themselves here, such as the dark objects *(muscæ volitantes)* and other spectral illusions. Strabismus is a frequent symptom, and consequently double vision, from a want of correspondence in the axis of both eyes. Persons can often see things better when they examine them on one side, or in a different direction to that which corresponds with the axis of vision. In these instances an attempt is made to throw the image on a different part of the retina, which is perhaps less affected than the central portion, the part of it generally used for this purpose. As the period of its continuance becomes prolonged, vision becomes more and more imperfect, until at length the patient can barely discern between day and night. This period may be considerable: weeks, months, or years may elapse from the commencement to the completion. When this arrives, and when both eyes are lost, there is a peculiar vacant stare, which tells you at once the condition of the unfortunate patient. In this state the pupil is usually broadly dilated, often with an appearance of muddiness or discoloration, and the iris generally uninfluenced by light. This is often imperceptible when one eye only is affected and open to

light. Exceptions to this condition of the iris are, however, not unfrequent, as we often find confirmed amaurosis with regular contraction and dilatation of the pupil. In these instances it would seem that the morbid action had been confined exclusively to the retina. Considerable irregularity in the shape of the pupil is also frequently observed, independently of adhesion between the iris and capsule of the lens. This state of perfect darkness is the one to which the term *gutta serena* has been applied.

Causes.—In addition to the causes which produce the more active form of the disease, there may be a state of constitution which has been exhausted by habitual intoxication and licentiousness, and which leaves a nervous debility powerfully predisposing to this form of amaurosis. It may likewise be congenital and hereditary, several members of the same family frequently being in this state. There may be also metastasis, or translation of diseases from other parts, such as the chest, kidneys, &c. to the retina.

Treatment.—If we can trace out any symptoms of disturbed vascular action, particularly before the affection becomes confirmed, our aim must be to accomplish its reduction. In many instances relief is obtained by the practice of bleeding, more particularly from the neighbourhood of the organ,

by cupping on the temples, or leeches in its vicinity. Counter-irritation by blisters, or tartarized antimony, or the use of a seton or issues, in the temples or neck, will often powerfully contribute to the improvement of the organ. As well as in the more active state of the disease, mercury will be found a valuable part of the treatment; indeed no case, that is not utterly hopeless, should be dismissed without a trial of this powerful agent. The state of the bowels must be attended to, as a matter of course. Local applications have been recommended, such as spirits of wine and ether, &c. Remedies of this description, if applied sufficiently strong, to irritate the external parts, must be considered in the same light as blisters, and to act on the same principle. If applied in a milder way, they may act as refrigerants, and assist in cooling the organ, which can never be injurious. The vapor of liq. ammoniæ has been recommended, by Scarpa, to be applied so as to irritate the conjunctiva; any effects it may produce must be considered as arising from counter-irritation. Some continental practitioners, particularly the Germans, are in the habit of using *emetics*. In this country they do not seem to have been much tried, and, when they have, not to have produced any decided effects.

In the perfect amaurosis, or gutta serena, powerful stimulants have been frequently used, and sometimes with benefit.

Electricity was at one time a favourite mode. This must be a dangerous remedy, if applied when the disease is in its active state. The *strychnia* has also been recommended, particularly applied locally to a blistered surface. In common with most others, I have found it to be of no real service.

Internal stimulants and tonics were formerly much in vogue, such as ether, phosphorus, camphor, bark, &c. They seem not likely to influence the retina, and are now disused, except for a more general purpose.

On the whole, if this disease of the retina be at all to be influenced by medicine, it must be by the active antiphlogistic, mercurial, and counter-irritant practice.

Sympathetic, or *functional amaurosis*. — Many cases of amaurosis occur, in which there is no appearance of disease in the retina, except by its disturbed function. That a state of this kind should frequently accompany disease in the brain, or optic nerve, is only what might reasonably be expected. Numerous cases of this description are on record, and are constantly observed in practice, where amaurosis is combined with hydrocephalus, apoplexy, &c. We are told, likewise, of cases occurring from sympathy with diseased states of the stomach, bowels, and other remote organs. That

amaurosis is often an accompaniment of these morbid conditions, no question exists; but a question may be raised, whether the retina ever becomes influenced in this way, except as a consequence of similar influence in the brain itself, the sympathy of the retina being, in my opinion, merely an extension of that of the brain.

It will always be desirable to ascertain, in every case of amaurosis, if there be disease in any other part of the system to which that state can reasonably be referred; that being done, to apply our remedies to the organ, with which the retina is supposed to sympathise, as has been already remarked. This is more particularly observed to be the case in affections of the brain.

Amaurosis from debility. — Occasionally in very feeble, delicate individuals, such as have had hæmorrhage, profuse salivation, &c. a species of amaurosis is observed, which seems to arise from general debility, with a feeble condition of the circulating system. This is more particularly noticed in a combination of this state with that of suckling. When it is clearly distinguished, it is to be treated by such means as are adapted to improve the general health, with local counter-irritation and alterative doses of mercury; whilst a contrary state, attended with general plethora, also from

suckling, requires depletion and antiphlogistic treatment, and which must be carefully distinguished from the former.

Injuries of the retina. — A blow upon the eye has been sometimes known to injure the retina, so much so as to paralyze its action at once, and this without any particular injury to the other parts of the organ. This is supposed to be owing simply to the *concussion*, which the nervous matter of the eye sustains, similar to what is observed in the brain. There may be some lesion, some slight rupture of the substance of the retina, with hæmorrhage. If this be but trifling, vision will often return, with proper attention; but if more severe, the chances are unfavourable. In violent injuries of the globe, more particularly of the sclerotica, where there is a rupture of its coats, vision is generally irrecoverably lost, from simultaneous injury of the retina, and is often followed by absorption of the globe (atrophy). It is usually remarked, that after the vision of one eye has been lost from accident, the other is very apt to become amaurotic, so that great caution is requisite under such circumstances.

Slight punctures of the retina, such as are made with the needle in cataract operations, do not seem of much importance; indeed considerable interference must often be made with it, particularly

when the lens is depressed. There can be no doubt, indeed, that it often occasions amaurosis, but still very frequently no bad consequences follow.

THE IRIS.

Structure.—The iris is that portion of the eye, which is the point of attraction to external beholders, and the seat of beauty, as it is of colour. It is this that gives character to the whole eye, and some even consider it an index of the mind; whilst for elegance and splendour of structure it is unparalleled in the animal body.

In its general appearance the iris resembles considerably the choroid, particularly at its posterior aspect. That portion of the choroid, called the ciliary body, seems to be doubled down to the corresponding portion of the sclerotica, the ciliary ligament, into which it is inserted, so as to form a moderately firm point of adhesion, and from which it is reflected immediately posterior to the cornea and aqueous humor, in the form of a circular curtain, stretching transversely across the interior of the organ, and dividing it into two compartments or chambers, anterior and posterior. Near its centre, but inclining somewhat more to the inner angle, and rather more above than below, is

an aperture termed the pupil. This does not exist in the fœtus, the membrane being entire, or as others say more correctly, the aperture is occupied by a thin structure, called *membrana pupillaris*, which becomes absorbed before birth. The structure of the central portion of the iris seems undoubtedly muscular: its fibres are distinct. If there were any doubt as to its possessing muscular fibres, its actions are sufficient to establish its muscularity. In many living eyes these fibres are most distinct. Indeed it is easy, in many eyes, to trace two distinct sets of fibres; a set of circular or sphincter fibres, to close the aperture, immediately surrounding the pupil; and another set, the radiated fibres, which must dilate the pupil, proceeding from the ciliary margin, and separated from the sphincter fibres by a whitish band, consisting of a series of segments of circles. These form, in fact, two muscles, and correspond with the orbicularis and levator palpebræ. By the action of these two sets of muscular fibres is effected the change in the size of the pupil. The radiated fibres are much firmer than the sphincter.*

* It must be stated that some authors deny the existence of muscular fibres in the iris, and speak of it as being, what is termed, erectile tissue. An eminent physiologist, Dr. Roget, is so strongly impressed with the opinion of the iris being muscular, and possessed of both radiated and sphincter fibres, that he has, in his "Bridgewater Treatise," given a diagram representing

The posterior aspect of the iris is termed the *uvea*. Like the choroid it is covered with the pigmentum nigrum, which may be seen fringing the pupillary margin when contrasted with an opaque lens. It is probable that the colouring matter on the anterior portion of the iris is also similar, except in hue, to that of the choroid, being a secretion from its vessels. It does not seem quite so easily removed from it, as that of the choroid, resembling, in this respect, the coloured portion of the membrane in animals termed *tapetum*. It undergoes considerable change from disease, and varies at different periods of life. It is plentifully supplied with blood-vessels and nerves, which are termed *ciliary*. A delicate transparent membrane lies upon the anterior surface of the iris, in contact with the aqueous humor. It is described as a continuation of the membrane of the aqueous humor which lines the anterior chamber, and secretes that fluid. I consider it to stand in the same relation to the iris as the conjunctiva does to the eyelids.

The iris, then, may be described as consisting of three distinct parts, viz. its lining membrane,

both sets of fibres. If the iris be not muscular, it may be asked, what occasion is there for its having branches from two motor nerves?

anteriorly; its muscular fibres, underneath the former; and, posteriorly, the uvea.

Use.—This is evidently to regulate the quantity of light to be admitted into the posterior chamber. In possessing the power of contracting and dilating its aperture, it is enabled to do so under different degrees of light, and at various distances. In looking at distant objects the pupil dilates, to let in the more distant rays; when examining near objects, it contracts to exclude the rays reflected from those afar off. The natural condition of the pupil is moderate dilatation, corresponding with the opening of the eyelids, when we are awake. In a state of sleep both are contracted—the instant we awake both open. Afterwards the pupil, as well as the eyelids, accommodate themselves to the degree of light admitted to them, contracting on exposure to a strong light, expanding when the light is diminished. Various occupations also tend to vary the dimensions of the pupil. Individuals who read much, or who are in the habit of looking closely at minute, luminous, or very near objects, are apt to acquire a habit of contracting the pupil, which remains with them, and which renders them near-sighted; whilst in those who are exempt from these causes, the pupil is habitually more dilated, and they are consequently not inconvenienced in this way. Many

persons believe that nearsightedness depends upon some undefinable condition of the humors of the eye. My experience, on the contrary, leads me to believe, that the condition of the pupil is usually the chief, if not the sole agent in accommodating the eye to distant or near objects. We must not omit to notice the correspondence of actions here also between the eyelids and iris;—for example, in looking at distant objects the eyelids are separated widely, and the pupil as widely dilates, and in looking at near or minute objects, both equally contract.

It has been usual to refer the motions of the iris to a supposed connection with, or dependence upon, the retina. Many facts may be advanced in proof, that the changes of the pupil are independent of the retina. They have no communication with each other—their nervous supply is totally different, the sensibility and mobility of the iris depending upon the ciliary nerves;—the retina communicates only with the optic nerve. In many cases of paralysis of the retina, the iris is perfectly active. The opposite condition is also frequently noticed of dilated and motionless pupil, without loss of vision.

Either of these conditions is perfectly irreconcileable with the idea of the motions of the iris being dependent upon the retina: both form such

an insurmountable objection, that they cannot be got over. Mr. Lawrence, one of the highest authorities, has dwelt upon these facts as being opposed to that theory, although he has not suggested another more satisfactory.* These instances are of such frequent occurrence, particularly the former, as occasionally to be seen by almost every practitioner. That the iris should be generally paralyzed in amaurosis is not surprising, since morbid action in the retina can hardly fail to extend to the iris.

In the most densely opaque cataract, where very little or no light can get to the posterior chamber, the pupil, instead of being proportionally dilated to the unexcited state of the retina, is as active and as much contracted as ever, which could hardly be the case if that activity depend upon the quantity of light sent to the retina.

To explain this more clearly, we will adduce two instances, in which the facts will speak for themselves. 1. A. B. is affected with cataract of both eyes. The lenses are so opaque, as to allow of scarcely any light getting to the retina, consequently he is unable to discern any object but very indistinctly. *His pupils will be as much contracted as those of any other person.* 2. C. D. has no ca-

* Treatise on the Diseases of the Eye, by W. Lawrence, F.R.S., 1833. Page 38.

taract. His vision is perfect. He is placed in a darkened room, where there is so little light to affect the retina, that he is unable to discern any object, but very indistinctly. *His pupils will be widely dilated.* In these instances the retina is similarly situated as to the stimulus of light; and yet we find the pupil dilated in the one case, and contracted in the other. The inference to be drawn from these facts is, that the exterior of the eye and iris are acted on by the light, and that the contraction of the pupil is the result of that action; and, consequently, that the latter is not influenced by the quantity of light sent to the retina.

In the state of sleep the pupil is powerfully contracted, whilst the retina is unemployed, and in a state of complete repose.

By means of the lenticular ganglion, which gives off the ciliary nerves, the iris is connected with the palpebræ, by the third and fifth pairs of nerves; and all its relations seem to be with the eyelids and not with the retina. It is very common to find them both simultaneously affected with disease:—thus, if there be paralysis of the third nerve, the levator palpebræ and the iris are both motionless. In the experiments of Magendie, when the fifth nerve was divided, in dogs and cats, in whom the arrangement of these nerves is the same as in man, the iris was paralyzed, and the eyelids could not

be closed. I have seen disease, in which the eyelids and iris were both in a state of continued spasmodic action, a constant twitching and closure of the eyelids, and a corresponding rapid contraction and partial dilatation of the pupil, owing apparently to irritation affecting the fifth pair of nerves. Instances of this affection cannot be considered as by any means uncommon, since it is particularly noticed by BEER, to whom it could therefore be nowise strange.

By reference to the facts of comparative anatomy, this view of the relation between the palpebræ and iris is strengthened and confirmed. Insects are devoid of either. In fish we find the iris perfectly formed (as a portion of the optical apparatus) but motionless, and no eyelids. In the amphibia the iris is also present, with a feeble languid motion; and here we have the first rudiments of eyelids; these consist of folds of the common integument, with which the animal occasionally covers the eye, placed anteriorly and posteriorly, and resembling the third eyelid of birds and the mammalia. In birds the eyelids are perfectly developed, and the iris exceedingly active. KEISER found that after cutting away the eyelids, in birds, the contraction of the pupil accompanied every fruitless attempt to close the lids; so that it would appear that the motions of the iris are voluntary in them.

CARUS, from whose "Comparative Anatomy" these facts are taken, asks, "Does not this consonance of motion in the eyelids and iris, as well as the developement of mobility in the latter at the same time with the first appearance of eyelids, go far towards proving its muscularity?" It may be taken equally as a proof of their mutual action and relation.

In the mammalia we find the same striking analogy between the eyelids and iris. Before birth, as in man, the pupil is sealed up with the pupillary membrane, and the eyelids are closed by a similar membrane; and in those animals which are blind at birth, both these membranes disappear together.

From all these remarkable and striking agreements, it is not too much to draw the inference I have done, viz. that the sympathies and relations of the iris are with the palpebræ and not with the retina. I challenge the advocates of the latter opinion to bring forward such a string of facts in support of that view.

Finding such a resemblance in the actions of the palpebræ and iris, I was led to conceive that the latter was, in fact, an internal eyelid. I ventured to compare the sphincter fibres of the iris with the orbicularis palpebrarum, and its radiated fibres I thought corresponded with the levator palpebræ.

That their actions are analogous and correspond is certain. Carrying the comparison still further, it appeared to me not unreasonable, that the same nerves which I consider to bestow voluntary motion upon the palpebræ, viz. the third and fifth, might also preside over the motions of the iris; and that the fifth nerve might bestow upon the sphincter fibres of the iris and the orbicularis palpebrarum a similar power to that which the third nerve gives to the radiated fibres of the iris and the levator palpebræ. I was encouraged to persevere in this view by the fact, as mentioned by Magendie, that after division of the fifth nerve in those animals, whose ciliary nerves are the same as in man, both the palpebræ and iris were paralysed. A similar condition is produced by injury or disease of the third nerve. The anatomy of these nerves bears out this theory. The iris receives its nervous supply from the ciliary nerves, which pass off from the ophthalmic ganglion, which is formed by a union of branches from the third and fifth nerves, which latter also supply the corresponding muscles of the palpebræ; so that by this means there is a direct communication between the iris and palpebræ. In addition to the ciliary nerves passing from the ganglion, the iris receives two or three branches directly from the nasal branch of the fifth pair. It seems likely that these branches give sensibility to

the iris, whilst the ciliary nerves give to it its different motions.

For a fuller account of the various arguments I have adduced in support of these views, I refer the reader to a Paper on the Iris and Palpebræ in the Medical Gazette* of March 8, 1834, and to the Essay on the Physiology of the Iris.

We find in most authors the statement that light, directed simply upon the iris, does not cause it to contract, and that if pricked or touched it is not sensible. The latter statement I know to be positively incorrect. I have, myself, witnessed its contraction, from that cause, many times; and I suspect that when it has not been affected in this way, it must have been paralyzed by belladonna. I have not seen the former experiment tried, but I imagine there must be some fallacy in the statement, that light does not stimulate the fibres of the iris. The states previously alluded to of complete amaurosis, with a moveable pupil, and that of perfect cataract, in which the light is almost entirely intercepted in its passage to the retina, without any diminution of the motions of the iris, are a sufficient proof that its activity, if not dependent upon the action of light immediately, is, at all events, independent of its action upon the retina.

* See also other Papers in that Journal, April 19th and 26th, May 17th and August 16th, 1834.

Hitherto the iris has been considered as an organ *sui generis*, unlike any other portion of the body, and bearing no analogy to any other part. I trust I may not be considered too presumptuous in saying, it is now tolerably apparent that it resembles both in structure and function the eyelids, and that it is in fact an internal eyelid.

The motions of the iris are not so immediately under the will as are those of the eyelids, but still this is the case to a certain extent, as has been particularly explained by Dr. Roget; so that the ophthalmic ganglion (as is presumed to be the case with the other ganglia) may still be considered as, in some measure, a bar to voluntary motion.

It seems improper to pass from the physiology of the iris without noticing and offering an explanation of the action of belladonna upon it. This substance is usually applied, when wanted to dilate the pupil, to the eyelids and eyebrows, parts which are plentifully supplied with nerves from the ophthalmic division of the fifth. Branches from the same division of the fifth are also distributed to the iris, and give it the power of contracting the pupil. The belladonna then paralyzes the sphincter fibres of the iris, and the pupil becomes dilated, by its action upon the fifth pair, through this direct communication. Those fibres are extremely delicate and unattached to any firm point,

hence they are paralyzed by an amount of narcotic influence, which would be insufficient to affect in this way other fibres of firmer consistence and having a stronger attachment. Perhaps, also, the circumstance of their being so little under the influence of the will, may assist in explaining how it is that they are so easily paralyzed.

DISEASES OF THE IRIS.

Inflammation of the iris. Iritis, or iriditis. — Simple, or idiopathic iritis.

Symptoms. — The chief characters of inflammation of the iris are as follow : a contracted state of the pupil, a change of colour on the anterior surface of the iris, sometimes a distinct appearance of red vessels traversing the same, or effusion of blood in specks, and more frequently an effusion of pus from its lining membrane into the anterior chamber, with more or less inflammation of the sclerotica, conjunctiva, and other parts of the eye. Sometimes the pupil is quite closed up by an effusion of lymph, crossing it in various directions and uniting with the capsule of the lens. The colour of the iris, instead of its natural shining and brilliant appearance, is altered to a dirty green or yellow. In this state of things vision is soon lost, from the pupil ceasing to admit the rays of light

through its aperture. The pain is not often very considerable, particularly when the iris only is affected, but as this is seldom the case, we have sometimes great irritation from the external inflammation, which usually accompanies the morbid state of the iris, and of course likewise a considerable degree of intolerance of light, with some constitutional disturbance.

Causes. — These are probably similar to those which bring on inflammation elsewhere. It is very often produced by direct mechanical irritation, since it is very frequently consequent upon operations where it is at all irritated, either from the operation itself or from its results; as in breaking up a cataract, if the latter be hard and press upon the iris, inflammation will be almost sure to follow. But, no doubt, the same causes which produce conjunctival or sclerotic inflammation, will likewise cause a similar condition of the iris, since it is directly under the same local influence of the action of light as the former, and may be easily affected from other causes, through their common nervous sympathy and connexion.

Treatment. — There are two objects to be kept in view in the management of this disease: the first is to subdue, as rapidly as possible, the morbid action; the second, to preserve the pupil from becoming fixed, in a state of contraction. The

reduction of the inflammatory condition is to be effected by a combination of means. In the early stage more particularly, bleeding must be had recourse to, and, if the disease be very acute, from a vein, or by cupping, and a considerable number of leeches in the neighbourhood of the eye, with counter-irritation by blisters to the temple, or elsewhere near.

Mercurialization, however, is the chief point: perhaps in no disease of the eye is its good effects more perceptible, and we have the great advantage of visibly observing the changes which ensue from its use. When the mercury produces its specific effect upon the mouth, we observe simultaneously the disappearance of the muddy and discoloured look of the iris, and a rapid absorption of the matter effused into the pupil and anterior chamber, and, in short, a gradual decline of the disease.* The closure of the pupil is to be prevented by the application of belladonna extract to the eyebrows and lids. If this be not attended to, the inflammatory action will change the condition of the pupil from its naturally somewhat dilated state to that of almost complete closure.

The local application of opium, mixed with mercurial ointment, has been recommended to be

* The mode of administering the mercury is not very important; the pil. hydrarg. or calomel, every four hours.

rubbed upon the brow and eyelids, to relieve the pain sometimes felt in this disease. I do not know, from experience, whether it would cause a diminution of pain; but I should much fear it would have a tendency to increase the contracted state of the pupil, as in this respect we know it has a totally opposite effect to that of belladonna; and it may be a question, whether its internal administration, combined as it usually is with mercurials, may not have the same effect.

Oil of turpentine, in cases where mercury is objectionable from any cause, has been strongly recommended in drachm doses, with almond emulsion, and in many cases has been found of great efficacy.

On the whole, the treatment may be summed up in a few words: — local or general bleeding, according to the urgency and severity of the local and constitutional symptoms; the internal administration of mercury, so as rapidly to affect the mouth; the use of belladonna, to prevent a fixed, contracted state of the pupil; and other concomitant symptoms to be attended to on the ordinary principles of treatment.

Sub-acute and *chronic iritis.* — The active state above described may have, more or less, passed away, and a less intense form of the disease remain to be combated. If the external inflammation be

but trifling, and but little pain in the organ or neighbouring parts is experienced, probably counter-irritation by blisters, issues, &c. and the internal administration of mercury, with the local use of belladonna, continued for some considerable time, will be found the most efficacious means to restore the iris and pupil to their natural condition.

When the chronic state alone is left to contend with, a very long time will often elapse before the disease will be influenced by remedies, sometimes many months, and yet, after all, a great improvement will frequently result from proper means steadily employed.

Syphilitic iritis.—Probably this form of iritis is quite as frequently met with, if not more so, as the simple or idiopathic iritis. It occurs among the secondary venereal affections, and is then frequently combined with ulcerations of the throat and eruptive disease of the skin, as well as very often accompanying the primary syphilitic ulcers affecting the generative system.

The pain attending syphilitic iritis is usually felt more at night; but, in other respects, except its occurring in conjunction with, or as a sequel to, some venereal affection elsewhere, it affords no material difference in the symptoms it presents;

and more important still, it requires no variation in its treatment from that already mentioned as applicable to simple iritis.

Rheumatic and *arthritic iritis.*—Inflammation of the iris, occurring in rheumatic or gouty subjects, if it does not differ much in the symptoms attending it, seems to require some modification of treatment. Mercury does not seem here to be of that essential benefit, as in the other forms of iritis, but nevertheless may be properly employed in smaller doses. Colchicum is the favourite remedy here, administered internally. Counter-irritation by blisters or tartar emetic, and, if necessary, abstraction of blood locally, or from a vein, according to the degree of inflammation and constitutional disturbance, with diaphoretics, purgatives, &c. constitute the chief remedies. The local application of belladonna, and, from what I have had an opportunity of observing in some cases of this description, its internal administration, are likely to be productive of very good effects in this form of the disease.

Strumous iritis—is sometimes observed in children and young persons; but generally accompanyiny ordinary strumous ophthalmia, and admits only of the same treatment.

Closed pupil.—As before noticed, this is a frequent termination of inflammation of the iris. When, after a due and long continued use of the means already recommended, all hope of further improvement from the administration of medicine is abandoned, it becomes a point for consideration, whether or not the formation of an artificial pupil should be attempted. There are several points to be considered in arriving at a proper determination. Of course the chief is, whether the operation we shall resort to is likely to effect the object we have in view, namely, the restoration of useful vision. This involves other considerations than the mere condition of the pupil. The state of the retina more particularly, and that of the globe generally, will require to be carefully considered. If the retina has participated in anything like the amount of disease to which the iris has been subject, the probability is, that it will be no longer fit to perform its important function; and, consequently, that however successful we may be with the operation itself, the benefit to the patient will be nothing. If the globe generally presents the marks of chronic inflammation, the vessels of the conjunctiva and sclerotica being left in a varicose and enlarged condition, with thinning from absorption of the firm proper coat of the eye, so that the dark choroid is visible through its diseased struc-

ture; or if there be considerable or general opacity of the cornea, or the latter be in a state of conjunction with the iris, then but little good can be expected from any operation. The chief criterion seems to be the actual state of vision. If the patient be unable to discern with the affected eye any object whatever, particularly if he cannot distinguish light from darkness, this condition betrays such a total insensibility of the whole organ, as to give one little hope of remedy. It is proper, however, to distinguish between these two conditions, —the perception of objects, and the sensibility to light, since either of these may and do continually exist without the presence of the other, the sensibility to light being seated in the external parts of the eye and iris, whilst the perception of objects is confined to the retina.

If, on the whole, the chances should be considered favourable, the operation may be effected in two or three different ways.

Perhaps the easiest and least complicated operation, is the one termed *Adams's*. It consists in passing Sir William Adams's iris knife through the sclerotic coat, just behind its junction with the cornea, and through the centre of the iris into the anterior chamber; then, by a backward stroke of the knife, making a transverse section through the closed pupil of some considerable size, so as to

effect a new aperture for the transmission of light to the retina. This is often very easily effected, but sometimes the iris has become so attenuated, that it loses all property of resistance, and instead of the knife cutting backwards through the iris, the latter is carried along with it, and separates at the ciliary ligament, of course with a much less chance of a useful result.

If the iris be very flaccid, the aperture made in it will sometimes close again; but if it be upon the stretch from adhesions, this will be less likely to happen. If the crystalline lens be present in the eye, and occupy its natural position previous to the operation, it will frequently come forward through the aperture, and thus contribute to prevent the new opening from becoming again closed, and may afterwards be removed from the anterior chamber, either by absorption or extracted by a small incision through the cornea, according to circumstances.

A very similar operation to the one just mentioned was performed by *Cheselden* with considerable success. The only difference was, that the instrument of Cheselden was smaller, a needle with a cutting edge; whereas Adams's is much larger, and approaches more to a scalpel.

Other operations are effected by incision through the cornea. An incision of moderate extent having

been made in the cornea, the point of the knife is dipped into the centre of the iris, so as to perforate its substance. The aperture thus effected is sometimes found to be permanent; but the practice of *Wenzel* was afterwards to pass a pair of scissors into the wound, and snip off a flap of the iris.

The operations of *Janin* and *Maunoir* consist first in opening the cornea, and then perforating the iris with a pair of scissors; the latter operator afterwards made another incision through the centre of the iris, at an angle from the first, so as to effect a triangular pupil, the intervening portion of iris, between the two incisions, being found to retract, or otherwise disappear.

An operation was performed by *Beer*, and subsequently by *Gibson*, which had for its object the removal of a portion of the iris. The incision of the cornea is the same; an hook is introduced, and a portion of the iris laid hold of, and dragged out of the wound, which is then cut off with a pair of fine scissors; sometimes a slender forceps was introduced instead of the hook. This operation I have seen to answer very well, particularly in cases such as Mr. Gibson used it, of central opacity of the cornea. Sometimes a portion of the iris will protrude spontaneously, which may render unnecessary the introduction of hook or forceps, but which is removed with the scissors.

When the former operations are impracticable, from an almost entire opacity of the cornea, or any other cause, the *separation of the iris from the ciliary margin* is sometimes a desirable proceeding. This was first recommended, at the same instant, by *Scarpa* and *Schmidt*, both of whom have given cases of success from this proceeding. Scarpa used for this purpose his curved cataract needle. Schmidt first of all performed incision of the cornea; but, subsequently, he adopted a similar proceeding to that of Scarpa, as being the best. Experience, however, proves that this operation is of but little real service, and very seldom succeeds.

In the failure or inapplicability of all operations through the cornea and iris, some persons have been found with faith enough to believe that an aperture might be effected and maintained through the sclerotica. It is unnecessary to add, that such a proceeding has hitherto totally failed. It is worthy of remark, however, that justice was scarcely done to this operation, inasmuch as the operators omitted one material point, — they ought to have had a square of glass and some putty in readiness.

Tremulous iris. — In consequence of disease or injury to the eye, a very moveable state of the iris

is sometimes observed, so that in changing the position of the globe, it is seen to be in this tremulous condition. This I have seen where the sight has been not very much impaired; but, generally, it is considered the result of great fluidity of the vitreous humor.

Prolapsus iridis—must be treated in the manner already stated in speaking of ulceration of the cornea.

Variations of colour of the iris.—It is not uncommon to observe the iris in one eye different in point of colour to the opposite. This is sometimes the effect of disease, whilst in other instances there is reason to believe that it is congenital. We can hardly conceive that such a change can take place during life, except from some morbid action. Large spots of a brown colour are also observed in some individuals. I have not seen them, except with some accompanying imperfection of vision, and consider them as a result of absorption, the uvea being seen through the iris, as the choroid is through the sclerotica, when diseased.

Separation of the iris from the ciliary margin.—This is a frequent result of injuries, such as blows upon the eye. If the injury has been severe,

vision may be totally lost from affection of the retina. When the injury has been of a minor degree, this condition of the iris may remain with double vision, the light passing to the retina through the new aperture as well as the natural pupil.

Absence of the iris.—This may be total or partial, and is usually congenital. It may, however, be effected by absorption after injury. I have seen an instance of congenital absence of the whole of the iris, as well as a partial deficiency at the lower portion: the latter is called *coloboma iridis*, and somewhat resembles the deficiency of the lip, called hare-lip. With an absence of the iris, vision must necessarily be very imperfect. An artificial iris might be used in such cases, of a frame fitted to the eye, with a central aperture for a pupil.

THE ANTERIOR CHAMBER.

It is that portion of the globe which is bounded anteriorly by the concave surface of the cornea, and posteriorly by the iris and capsule of the lens. It is generally considered as being lined by a deli-

cate membrane, called the *capsule of the aqueous humor*, which is supposed to secrete that fluid from its surface. The quantity of *aqueous humor* which it contains must necessarily depend upon its size, which varies considerably in different individuals. This fluid is always perfectly transparent when the eye is in a healthy condition, and its other properties seem to admit of no better definition than its name implies.

Use.—The use of the anterior chamber must be to contain the aqueous humor, which forms a transparent medium for the passage of light from the cornea to the iris and lens.

DISEASES OF THE ANTERIOR CHAMBER.

Inflammation of the Capsule of the aqueous humor. Aquo-capsulitis. — This affection seems to be one forming a connecting link between corneitis and iritis, a combination perhaps of both.

Symptoms. — In this disease there is always more or less inflammation and opacity of the cornea: — it is but seldom confined to its internal lining. The anterior surface of the iris is also affected in the same manner with inflammation, opacity or discolouration, and effusion; and what

is iritis but the same? There is a tendency to a contracted state of the pupil also, but it seldom becomes adherent, and some external inflammation of the sclerotica and conjunctiva, particularly around the margin of the cornea, forming the usual pink zone of vessels. Pain in the organ and intolerance of light are common to this, as well as other inflammatory diseases of the eye. The aqueous humor is often turbid, or appears so, perhaps from the accompanying opacity of the cornea, whilst pus is often perceived in considerable quantity at the bottom of the chamber, forming what is termed *Hypopion*, and which is secreted by the capsule of the aqueous humor, or poured out from an abscess on its surface. More or less constitutional disturbance accompanies this form of disease, but not more than in corneitis or iritis simply.

Treatment.—This is the same as is adopted for the management of corneitis or iritis, viz. mild antiphlogistic, leeches, counter-irritation, mercurials, purgatives, &c. The mercury must be administered in sufficient doses to affect the mouth, particularly to adults; in children it must be used more cautiously. If the symptoms are unusually intense, venesection, or cupping may be requisite. As the inflammatory symptoms subside, the pus becomes absorbed, and the dulness of the aqueous humor and iris disappears; whilst

the opacity of the cornea is the last to be removed, and is very often permanent. After the active symptoms are removed, and little remains but the opacity and conjunctival inflammation, I have seen the application of the argenti nitras in substance of great benefit in clearing up the opaque cornea. Some practitioners have strongly recommended the evacuation of the matter of hypopion from the chamber; but the prevailing opinion now seems to be, that such an operation is improper, and that the matter will always become absorbed, as the diseased action, which produces it, subsides.

Effusion of blood. Hæmophthalmus. — Sometimes blood is effused into the anterior chamber. It is usually seen to result from violent blows or other injuries to the eye, but occasionally occurs from increased action in iritis. Like the matter of hypopion it becomes, after a time, absorbed; but whilst it is present, to any considerable extent, it is impossible to see the iris or posterior chamber of the eye.

Dropsy of the anterior chamber. — This is frequently a consequence of inflammation of the cornea, perhaps of the capsule of the aqueous humor. Its treatment is to be according to the general principle, whether actual disease is still going

on, or whether the eye is in a quiescent state. If there be increased action, this must be diminished by suitable means. It is sometimes recommended to evacuate the aqueous humor in these cases, but it seems doubtful if it is more proper than the evacuation of the matter of hypopion; although it is possible that in some instances it may be a very proper proceeding. The same operation has been advised in many active states of disease, as in iritis, purulent ophthalmia, &c.; but is very seldom practised, and certainly appears to be of somewhat questionable utility. The fluid, if evacuated, is rapidly restored in a very few hours.

Dropsy of the anterior chamber is sometimes congenital. I have met with but one instance of it at present. The cornea seemed to occupy nearly the whole of the front of the globe, so that scarcely any portion of the conjunctiva or sclerotica was perceptible:—there was a nebulous opacity, but no other marks of disease were present, and I considered it a malformation, and that it would be permanent; but, on seeing the child two years afterwards, the cornea and anterior chamber seemed no larger than usual, and the opacity was gone. Both eyes were affected alike when I first saw the child, which was a few days after its birth. Other cases of this disease have been recorded, particularly by Mr. Ware.

Animalculæ are sometimes observed in the anterior chamber.—A case of this description has lately been published by Mr. Logan. It would appear, from a subsequent account, that it has been extracted from the eye, and that the operation has been followed by serious injury to the organ.

THE POSTERIOR CHAMBER.

CRYSTALLINE HUMOR, OR LENS.

The crystalline humor, like the aqueous, in the healthy eye, is perfectly transparent and colourless. It is, however, of a very different consistence, being, in this respect, placed somewhat between the solid and fluid parts of the eye. It is not so solid but that it yields to the pressure of the finger, whilst, without such pressure, it will retain its natural form, even when handled. Its shape is that of a double convex lens, with the plane surfaces in contact, the posterior being more convex than the anterior. Its position in the eye is immediately posterior to the iris and aqueous humor, and between them and the vitreous humor. Its texture, when examined after removal from the eye, presents a series of concentric layers, which become firmer in consistence as we approach the

nucleus or centre, and is considered of a fibrous quality. That it must possess blood-vessels and the other apparatus of a living organ is certain, although we cannot observe them. How else can we account for the changes it undergoes, when the subject of disease? If it were not a living part it could never become dead, and could never exhibit the phenomena of disease, which it is observed to do. If it be detached from its natural connections it ceases to live, becomes opaque, acts as a foreign body in the eye, and is acted upon by its absorbent vessels. So that although no vessels are traceable into its substance, still reasoning from analogy of other textures (cornea, &c.), and observation of the changes effected by disease or injury, bring us to the inference, that it is a part endowed with vitality, like all other portions of the animal body. A contrary opinion, however, is entertained by some eminent practitioners.

The crystalline is embedded in the anterior portion of the vitreous humor, so that its centre is placed opposite to the pupil, the axis of the two being the same. It is surrounded by a fine, but rather firm membrane, called its capsule, which contains a minute quantity of fluid, named after its discoverer, Aqua Morgagnii. No doubt it is akin to the serous membranes.

Use.—The use of the crystalline is to bring to a focus the rays of light in passing to the bottom of the eye.

DISEASE OF THE CRYSTALLINE HUMOR.

Morbid changes of the crystalline humor are always productive of one very striking alteration in its appearance, a state of opacity, the technical term of which is cataract.

Of cataract.—An infinite number of names is bestowed upon the varied appearances which the crystalline presents, when in a diseased or opaque state. These have, for the most part, references to the mere figure or shape of the opaque portions of the lens or its capsule, which are very much diversified.

The general and practical divisions of cataract are into hard, soft, milky, accidental, and capsular. All other divisions are but variations of and subservient to these.

Hard cataract.—This form is generally found to be most common in elderly persons. The lens, instead of being perfectly transparent and invi-

sible, is observed behind the pupil, usually of a yellowish or amber colour, although it is sometimes of a darker shade, approaching to a slate colour, and now and then it may be of a grey or white appearance, thus preventing the due and efficient transit of light through its substance. Indeed, when this opacity is very considerable, frequently no object can be discerned by the retina, and little more than the power of distinguishing light from darkness is left to the patient. This, however, is not commonly the case when the retina remains sound. In ordinary cases the patient can make out objects around him, though dim and confused in appearance, and can usually see better in a dull light, from the dilatation of the pupil in that state, as also after the application of belladonna. It is seldom preceded by, or attended with, much local suffering or constitutional disturbance, although occasionally this is observed. Its progress is exceedingly various in different cases. In some instances an opacity is observable to a certain extent, which may not increase for many years, or indeed not at all; or, on the other hand, there is reason to believe that it may be formed, in a very short space of time, as is seen particularly in cataract from injury. The dark fringed edge of the iris is a striking object, placed

as it is in contrast with the opaque lens occupying the pupil.

In pure cataract the motions of the iris are as perfect as ever, the pupil contracting and dilating with the changes of light. If these motions of the pupil do not take place, we may suspect amaurosis. As an active pupil, however, frequently exists with a state of amaurosis, we must not depend upon this simply as a criterion of the healthy state of the retina, but must also take into consideration the actual state of vision. Many operations for cataract have been undertaken, where the pupil has been perfectly active, and the eye sensible to light, without any benefit resulting to the patient, the retina being afterwards discovered to be insensible.

Hitherto medical *treatment* has been of no avail in this disease. The only remedy is the removal of the opaque body from the axis of vision.

In cases of hard cataract this is accomplished in two or three different ways.

The first in point of importance, and, when efficiently performed, the most rapid and satisfactory operation is that termed *extraction*. The object here is to remove the opaque lens out of the eye at a single operation. Previous, however, to entering upon this, it is of considerable importance to ascertain if the patient be in a fit condition to

encounter it. If he be out of health, of a full plethoric habit, or troubled with cough, or any rheumatic affection, these conditions, or any of them, must first be remedied. Generally speaking, regular attention to the bowels, so as to keep them somewhat open, and a quantity of blood drawn from the arm, just previous to the operation, are the most important points to attend to. It would, of course, be improper to operate with any tracheal or pulmonary irritation, as the coughing must be highly injurious to the eye afterwards. So with rheumatism, there would be danger of the organ becoming attacked by it. Every thing being right as to the state of health, the next point is to choose a proper attitude for the patient, operator, and assistant. Some operators prefer that the patient be placed in the horizontal position, on a bed, table, or sofa: in that position the surgeon must place himself behind the patient, on a stool at a proper elevation, and secure the upper eyelid, while the assistant depresses the lower one. Other practitioners choose to have the patient sitting in a suitable chair, whilst they seat themselves in front of the patient, and take charge of the inferior eyelid, the assistant standing behind, who elevates and fixes the upper lid. Some surgeons, again, choose to dispense with an assistant, and manage both eyelids themselves. The

instruments necessary to be provided with, in this operation, consist of the following, the cornea knife, curette, and scoop. Others may also be required to enlarge the wound, such as a concave or convex bladed knife or scissors, &c. The first three are essential. The cornea knife, now in general use, is that called Beer's. It is of a triangular shape, and seems the best adapted for the section of the cornea. The operator being seated, we will suppose, in front of the patient, passes his knife rapidly through the cornea, commencing at the temporal margin, or a little higher, to the extent of about one-half or rather more of its circumference, keeping pretty near the ciliary margin, but not close to it. The aim should be to bring the point of the knife out at the part of the cornea, marked in your eye as the extreme boundary of the incision, and then cutting out between the two corresponding points of punctuation. This being properly effected, the eyelids are gently closed, and a few minutes pause being allowed for the patient to rest, and the practitioner to collect himself, the curette is then passed under the flap of the cornea, and cautiously conducted into the pupil, and the capsule of the lens gently pierced by it, so as to make a rent for the egress of the lens.

The instrument being withdrawn, and another short pause given, the eyelids are again separated,

and gentle pressure made upon the eyeball with the end of the scoop or other suitable instrument, when the lens is observed to protrude through the pupil, and then out of the external wound. If the incision through the cornea has been too small to allow of the exit of the lens, it then becomes necessary to enlarge the wound. This is effected by particular instruments made for this purpose, knives of various shapes, and fine delicate scissors. It is always desirable to avoid having recourse to more than one instrument and one incision, as the chance of success often depends upon the greater or less injury inflicted upon the organ during this operation. Sometimes, with the best incision, a failure will occur, from the lens rather receding than advancing, when pressure is made upon the globe; probably from want of resistance in the vitreous humor or its capsule, and occasionally, perhaps, from strong action of the sphincter fibres of the iris, closing the pupil. If, from any cause, the completion of the operation be considered impracticable or not likely to be effected without injuring the organ, it is best to pause. The capsule having been ruptured, the lens has likewise been wounded, and is exposed to the action of the aqueous humor. It is better to leave it to be thus acted upon. Absorption of the lens will follow. If it should not proceed with sufficient rapidity, or irritation and

inflammation be set up in the iris or other parts of the eye, it will then be proper to evacuate the remaining portion of the lens, which may be easily effected by a small puncture of the cornea, as in the course of a few days it will have become almost in a state of fluidity. If it should not follow the knife, the scoop introduced through the puncture will bring it away with facility.

After these operations, it is essential that the organ be kept as nearly in a state of repose as possible, for several days, or until the wound of the cornea is united, and any subsequent inflammation of the eye removed. Some practitioners merely apply a wet rag upon the eyelids, which is secured by a light bandage passed around the face and head. Others are in the habit of making the eyelids act as a compress to the wound of the cornea, causing them to be shut, and then kept in that position the requisite time by thin straps of Court Plaister. I think the latter the best proceeding, since it prevents the incessant winking motions of the eyelids, which must, more or less, irritate the wounded cornea. Generally it is proper not to examine the eye until after three or four days have elapsed. If much inflammation succeeds the operation, it must be combated by free bleeding, general and local, and all the means usually resorted to for that purpose. This is best

prevented by a state of perfect quietude of mind and body, the patient being confined to bed in a dark room for the first week or so, and kept cool and free from disturbance of all kinds. A prolapsus of the iris occurring after the operation, must be treated according to the general principle elsewhere laid down. During the operation, gentle friction upon the cornea through the eyelids, or a lighted candle applied to the eye, will cause it to recede.

The next operation for hard cataract is that of *depression*, or couching. If the former operation be deemed impracticable from any cause, such as a sunken eye, a small anterior chamber, want of steadiness in the patient, or of adroitness in the surgeon, &c. then this is the operation to be performed. The pupil having been previously dilated by the application of the extract of belladonna, moistened and laid upon the eyebrows and lids for an hour or two, the operation is effected by passing a cataract needle laterally through the sclerotica, at the outer angle of the eye, just behind the iris and before the lens into the pupil, the needle then being used in such a manner as to depress the lens into the bottom of the posterior chamber, below the pupil and out of the axis of vision. This is generally easily effected. It is not so easy however to keep it down. So that to prevent its rising,

it is necessary to retain the needle in the eye in contact with the lens for a short time. It will, notwithstanding, very often, after removing the needle, be found to occupy at least a portion of the pupil. The after treatment must be conducted on the same principles as previously laid down, but perhaps not quite so rigorously enforced. If the lens has again arisen, and seems likely to irritate the iris, it will be as well to apply a belladonna plaster over the eye, to keep the pupil dilated, and thus prevent, in some measure, the contact of the lens and iris, and the consequent contraction and closure of the pupil.

A modification of this last operation is sometimes practised, and which is termed *reclination*. It is effected by passing the needle between the iris and lens, introducing it through the sclerotica from below, and depressing the lens in such a manner, that the anterior portion shall lie uppermost, and the posterior portion lowermost in the bottom of the eye, below the pupil.

The operation for depression cannot be performed without risk of injury to the retina as well as the iris, so that amaurosis is by no means an unfrequent result of this operation.

Soft or *fluid cataract*.—The soft is easily distinguished from the hard cataract, by its occurring

in young persons, it being very frequently congenital, and by its different appearance in the eye, the soft cataract being generally of a milky white appearance, whilst the hard is of a yellow or amber colour. In the eye it is much more distinct and striking than the hard cataract, and is generally observable on a very superficial view of the organ, from the complete contrast it exhibits to the clear black of the pupil, and the darker shade of the iris.

The usual operation for this species of cataract, is what is termed for *solution*, or, more properly, *absorption*. It consists in passing the needle through the sclerotica and behind the iris into the pupil, rupturing the capsule, and, more or less, breaking up the substance of the lens. Of course the degree of this will depend upon its consistence. If the lens be fluid, or nearly so, it will immediately flow into the aqueous humor, rendering it turbid; if it be more compact, it will probably remain *in situ*. It is generally considered best not to do too much in the first operation, seldom more than laying open the capsule, so as to expose the lens to be acted upon by the aqueous humor; and, if necessary, repeating the operation at intervals of three or four weeks, or more, after the eye has recovered from the effects of the first operation.

A variety of this operation, termed *keratonyxis*, consists in passing the needle through the cornea

and anterior chamber into the pupil. Some surgeons think that less subsequent injury follows a wound of the cornea than one of the sclerotic coat. As far as my observation goes, I take the same view of the case. Previous to either operation, it is necessary to dilate the pupil with belladonna, so as to lessen the risk of wounding the iris: it must also be applied afterwards to keep the lens and iris from being in contact, and to expose the ruptured lens more freely to the aqueous humor. In other respects, the after treatment must be the same as in the previous operations, guarding against inflammation, and combating it when present by the approved means.*

Either of the two latter operations is had recourse to in children, when the disease is congenital, or, in after life, indifferently. Infants are operated upon at all ages, from four or six months upwards. Less inflammation seems to follow in their cases than in adults; but it is always proper to avoid the period of dentition.

The compound operation.—When much irritation follows the needle operation, or when it is wished

* A very unnecessary degree of importance is often attached to the particular kind of needle to be used in the performance of these operations, and every oculist has his *pet* needle. The best operator would be satisfied with a good sharp stocking needle.

to get rid of the lens with greater expedition, the same plan is sometimes adopted, as mentioned before, viz. of allowing the lens to be exposed to the action of the aqueous humor for a few days, and then making a puncture in the cornea for its evacuation, thus effecting the removal, at once, of what might be many weeks or months before it became absorbed in the eye. Judiciously chosen and practised, this operation seems to be a very useful one. A great deal of valuable time may often be saved to the patient, and sometimes considerable danger to the eye averted. In many instances, the lens, acting as a foreign body in the eye when broken up, will produce a degree of inflammation which may terminate in closed pupil, amaurosis, or other formidable diseased condition of the globe. To prevent such disastrous occurrences as these is a very desirable object, to effect which the performance of this compound operation seems to be the best mode of procedure. It has been extensively practised at the Manchester Eye Institution, and generally with the greatest success. It is, in fact, resorted to on the same principle as in accidental cataract. The late Mr. Gibson was the first to practise this operation.*

* See Gibson on Artificial Pupil, &c.

Injuries of the lens.— The lens or capsule cannot be touched or injured without producing opacity. A blow on the eye will often cause the same condition. This state is termed *accidental* or *traumatic cataract.*

Accidental cataract generally arises from a punctured wound of the eye, which penetrates the lens or capsule, and is effected by the agency of sharp substances or instruments, such as needles, forks, arrows, stones, &c. or by blows from the fist, &c. If but little irritation follows, the cataract may be properly left to itself, as, in process of time, the action of the absorbents will generally remove at least a considerable portion of it. When this plan is adopted, it is usual not to interfere further than by abating any moderate degree of inflammation that may ensue by leeching and the usual means, and the application of belladonna to prevent adhesions between the lens and iris; afterwards, in the course of a few weeks or months, when the absorbent action has accomplished all it seems likely to effect, if a portion of the lens or the capsule remains, to have recourse to the needle, as after the common operation, or to extract it by a small puncture of the cornea. Usually, however, there is more irritation found to follow

accidents of this description. Great inflammation, accompanied by considerable suffering to the patient, calls for a more decided treatment. The irritating body (the lens) must then be extracted by a small puncture through the cornea, in the following manner. The cornea knife is introduced through the cornea from the temporal margin, its point being carried into the pupil, when the lens, usually in a fluid or semifluid state, flows through the puncture along the knife, with the aqueous humor. If this should not take place, the knife being withdrawn, the scoop must be passed through the wound to the pupil, when the dissolved lens usually lodges in its bowl, and is thus removed. The case must then be treated as after the ordinary operation for extraction. I have seen this operation of decided benefit in numerous cases, in some even where the cornea and other textures have been materially injured. The profession is indebted to Mr. Barton for the introduction of this operation in these cases, an operation which is practised by him with the greatest dexterity and success.*

* See a paper by that gentleman in the Medical Gazette, March 20th, 1830; as also an extended report of several cases, treated at the Manchester Institution, by R. T. Hunt, in the North of England Medical Journal, vol. i. page 481.

Capsular cataract. — After the lens has been removed, either by operation or absorption, a portion of the capsule generally remains. Being of a much firmer and more fibrous consistence than the lens, it is not easily acted upon by the absorbent vessels, and consequently often remains, when left in the eye, as great a bar as ever to vision; hence it becomes necessary to effect its removal. Generally breaking it up with a needle is sufficient to increase the power of the absorbents over it, particularly if it can be divided into lesser portions. It may sometimes be depressed below the pupil into the vitreous humor, at other times extraction by a small puncture of the cornea may be advisable, if it seems to remain uninfluenced by the aqueous humor.

After the pupil has been completely cleared of all opaque substances, the eye still remains unfit for perfect vision. The sight is never so good as in the healthy eye, but, to render it more serviceable, an artificial lens, in the form of a glass before the eye, must be used. With this means very fair and useful vision is often obtained, and it seems to improve by time.

When any of these conditions of the lens affect only one eye, some practitioners prefer not interfering. I think it is often advisable to operate even when one eye only is affected, particularly in

young persons, to whom appearance is of some consequence; and I have known instances of individuals, who, when suffering under inflammation or injury of the sound eye, have experienced great inconvenience from the uselessness of the eye affected with cataract. In many instances, however, it seems unnecessary to interfere when one eye only is cataractous.

When there are cataracts in both eyes, it is usual to operate on one only at a time, particularly when extraction is resorted to.

Dislocation of the lens.—This is usually the consequence of accidents, attended with some violence, such as blows; although I have seen a remarkable instance, (under the care of my friend and colleague, Mr. Windsor,) in which the lenses had got into the anterior chamber in both eyes, without any injury, and where both were transparent, and appeared like a lump of solid jelly in the aqueous humor, and of a bright gold coloured tinge. Considerable inflammation, pain, and intolerance of light were present, and very little vision. The lenses were extracted, and some vision was restored in one eye, but the other was perfectly amaurotic. Other instances of this spontaneous dislocation are on record. One would suppose it to arise from more

or less absorption of the capsule, so as to allow the lens to escape from its natural position.

I lately had a case where the lens had been forced through the choroid and sclerotic coats, lodging under the conjunctiva. It was evacuated by a puncture, and found to be of a gelatinous consistence. Cases of this description are not so rare. I have seen several similar instances, and others are recorded by Mr. Mackenzie, Mr. Hunt, &c. The injury is generally so severe as to destroy the functions of the organ. The dislocated lens has sometimes been found ossified after long residence in its new position.

VITREOUS HUMOR.

The vitreous humor is that clear pellucid fluid, which, with its membrane, fills up the space called the posterior chamber of the eye, at least with the exception of the crystalline lens. It is somewhat heavier than water, although when evacuated from the eye, it is not sensibly different from it.

It is bounded anteriorly by the lens and ciliary body, and laterally and posteriorly by the retina, and consequently occupies the space which lies between these respective parts. Its tunic, called

the hyaloid membrane, not only surrounds the vitreous humor in contact with the retina, lens, &c. but forms cells intersecting through its entire substance for its lodgement. This tunic is unconnected with the retina, except at its conjunction with the optic nerve. The vitreous humor and its tunic occupies more than three-fourths of the globe.

A duplicature of the tunica hyaloidea surrounding the crystalline humor, described by Petit, is called after him, the *canal of Petit.* By inflation it may be shown to be of irregular dimensions, hence it is sometimes called *canal godronné.*

Like the aqueous humor, this fluid is not rendered turbid or opaque, as the crystalline humor is, by contact with foreign bodies: if this were not so, then operations upon the eye would be next to impossible, since it would be difficult to introduce an instrument into the organ without injuring one or both of these humors.

Use.—The vitreous humor permits the rays of light to pass through its substance without materially altering their direction. A certain space being necessary between the lens and the bottom of the eye, it could not be better filled than by this transparent fluid. It distends the globe, and by its uniform pressure keeps the other portions of the posterior chamber in their proper situation.

DISEASES OF THE VITREOUS HUMOR.

Synchisis oculi. — Softening of the globe may sometimes arise merely from deficiency of the vitreous humor, or conversion of its substance into a more watery fluid, or from absorption of the cells and substance of the hyaloid membrane. In this state of the eye, the lens, iris, and retina are often seen floating about in the disorganized vitreous humor. This condition is, however, not known to arise, except as a result of, or in connexion with, some general disease of the eyeball, and therefore it must be looked at in this point of view. The same may be said of dropsy of the posterior chamber. These points are better noticed under the consideration of diseases of the globe generally.

The vitreous humor is also said to be occasionally subjected to a change of an opposite character, viz. conversion from a fluid to a more solid consistency, so as to resemble boiled rice in density and opacity. These cases are very rarely met with, and, although somewhat resembling malignant disease, are considered quite harmless, except so far as vision is concerned.

Hæmorrhage. — Blood is sometimes effused into the posterior chamber after severe blows, and

sometimes it is observed after operations. If the quantity be small, and the injury to other parts inconsiderable, it will be absorbed in a certain time. In general, such an occurrence is unfavourable, since it implies great mischief to the organ.

Glaucoma.— An affection of the eye under this title, is described often as a disease of the vitreous humor. In it this humor is of a dark green tint when seen through the pupil; but it has not yet been proved that the vitreous humor is primarily affected in this complaint. It is generally combined with some morbid condition of the retina or choroid, and may be considered only as a symptom of amaurosis. Undoubtedly a great deal more than this might be said about *glaucoma*, but I fear but little can be done for it. It must be treated as amaurosis.

THE ORBIT AND ORBITAR APPENDAGES.

The boundary of the orbit itself is formed by a union of some of the bones of the cranium and face. The shape of this cavity is that of a quadrangular pyramid, the base situated on a level with the face, the apex at the bottom of the orbit,

adapted to the gradual swelling out of the muscles and globe of the eye. The bones which enter into the formation of the orbit are superiorly the frontal and sphenoid; inferiorly the palate bone behind, the superior maxillary in the middle, and the malar bone in front. The temporal region of the orbit is formed by the sphenoid posteriorly, and the malar anteriorly; the nasal region by the sphenoid posteriorly, the ethmoid in the middle, and the os unguis anteriorly.

The walls of the orbit are lined by a continuation of the dura mater, which forms their periosteum.

In addition to the globe, the orbit contains a number of parts subservient to it, viz. the muscles for motion, nerves for sensation, blood-vessels for supplying it with the nutrient principle, and the lacrymal gland, for the supply of the fluid called tears.

The muscles of the globe are six in number, four of which are termed *recti* or straight muscles, the other two *obliqui*, from their oblique direction. The recti arise from the bottom of the orbit, round the margin of the foramen opticum, and proceed along the orbit encircling the optic nerve, ranging themselves around the globe, and are inserted by their tendons into the sclerotic coat. They receive names from their relative position, external, in-

ternal, superior and inferior, and serve to regulate the motions of the eyeball in the direction in which they act.

The oblique muscles are two in number, the superior and inferior. The superior oblique or trochlearis arises from the bottom of the orbit with the recti, passes along the upper and inner part of the orbit, and through a pulley of cartilage which is fixed to the os frontis, behind its internal angular process, and is inserted into the posterior and upper portion of the globe, under the superior rectus. The inferior oblique arises from the anterior part of the orbit. It is attached to the orbital plate of the superior maxillary bone, on the outer side of the lacrymal groove. It runs obliquely between the globe and the inferior rectus, and is inserted into the sclerotic, at its posterior and external surface, near the optic nerve. The oblique muscles assist in completing the motions of the globe, particularly those intermediate actions, which are not effected by the recti.

In addition to the muscles of the globe, the *levator palpebræ* likewise traverses the orbit: arising from near the foramen opticum and passing into the upper lid, it is inserted between the conjunctiva and the orbicularis palpebrarum. Its office is to separate the eyelids.

The nerves in the orbit are as follow,—the

second, or optic, the third, the fourth, the ophthalmic branch of the fifth, and the sixth.

The largest and the most important, perhaps, is the *optic nerve*. It is protected with great care, being embedded in, and surrounded by, a soft cushion of fat. An additional guard is afforded to it by the muscles of the globe, which also surround and enclose it. Lastly, it possesses a covering from the dura mater, which completely invests it. Passing from the base of the brain through the foramen opticum, it perforates the posterior portion of the globe, and gives origin to the nervous membrane called the retina.

The optic is exclusively the nerve of vision. It has no function but that of conveying images to the brain, as is well expressed by a celebrated living philosopher. "The optic nerve is the channel by which the mind peruses the hand-writing of nature on the retina, and through which it transfers to that material tablet its decisions and its creations."*

The *third nerve*, or motor oculi, in passing through the orbit, gives branches to the ophthalmic ganglion; three of the recti muscles, viz. the superior, inferior, and internus; the inferior oblique; and the levator palpebræ superioris. The branches to the various muscles of course endow

* Letters on Natural Magic, by Sir D. Brewster, p. 10.

them with the power of motion. The branch given to the *ophthalmic ganglion* will be considered afterwards.

The *fourth nerve*, or trochlearis, is distributed exclusively to the trochlearis muscle, or superior oblique. It is a nerve of motion. Sir C. Bell considers it as belonging to the class of respiratory nerves, and as connecting the eye with the motions of the face in respiration or expression.

The *ophthalmic division of the fifth* gives off three branches, which traverse the orbit, viz. the supra-orbitar, the lacrymal, and the nasal. The *supra-orbitar* gives off a few branches in the orbit, and then passes upon the levator palpebræ in two branches, external and internal, to the forehead. The *lacrymal* passes to the lacrymal gland and the eyelids. The *nasal* gives a branch which joins the third, to form the ophthalmic ganglion; two other branches afterwards, which pass with the ciliary nerves to the globe; and its remaining portion passes through the ethmoid foramen to the nose and side of the orbit. The fifth is a nerve of motion as well as of sensation, and it is more than probable, that some of the branches in the orbit administer to both properties.

The *sixth nerve*, or pathetic, is distributed solely to the external rectus, or abductor muscle, and endows it with its motive power.

The *ophthalmic* or *lenticular ganglion*, as before alluded to, is formed by a union of a branch of the third with one of the nasal branch of the fifth. After this union a number of small nerves pass from the ganglion to the globe, and are easily traced to the iris;—they are called ciliary nerves, and appear to possess the properties of the nerves from which they arise. This ganglion, I believe, is only found in those beings who possess perfect eyelids and an active iris. It may therefore be presumed, that it is for the purpose of connecting these parts together. Upon enquiry, it will be found that their motions almost always correspond. This is not wonderful, when we consider that other branches of the nerves which form this ganglion go to the eyelids. The third nerve is distributed to the levator palpebræ, which separates the eyelids; and the fifth gives branches to the orbicularis palpebrarum, which I believe bestow upon it the power of motion. If this be correct, it is not unreasonable to suppose that the two branches which go to the iris, through this ganglion, bestow upon it similar actions, viz. the third to dilate the pupil, and the fifth to contract it. It seems probable that those branches of the fifth, which are given off, as ciliary nerves, after the formation of the ganglion, are for endowing the iris with sensibility, under which term

is meant, not merely common sensibility, but also sensibility to light.

The principal artery which passes through the orbit is derived from the internal carotid, and is termed *ophthalmic artery*, from its destination to the eye. It lies upon the temporal side of the optic nerve. The first branch which it gives off penetrates the optic nerve, and passes in its substance to form the arteria centralis retinæ. Other branches are afterwards given off, such as the long ciliaries, lacrymal, and muscular branches, to the different parts of the orbit, eyeball, eyelids, &c. The blood is returned by numerous veins, which unite to form the *ophthalmic vein*, which passes through the foramen lacerum to the cavernous sinus of the dura mater.

The *lacrymal gland* is lodged at the upper and outer portion of the orbit, in a depression of the frontal bone. It is about the size of a small almond, of a flattened and oval shape. It gives off six or seven ducts, which perforate the upper eyelid to give passage to the tears, which it secretes.

DISEASES OF THE ORBIT.

Inflammation and suppuration in the orbit.—Inflammation within the orbit is attended with the

usual symptoms, violent and deep-seated pain, shooting into the head, great heat and tenderness, with disposition to suppuration. The swelling of the orbitar contents pushes the globe outwards, producing the state called ex-ophthalmia. In this condition there is often considerable general disorder of a febrile character, attended with delirium. This is not surprising, when we consider the proximity and direct communication between the brain and the affected parts. From the pressure on the nerves, it is not surprising that their functions should be interfered with. Thus we find vision lost, the motions of the globe more or less suspended, and the sensibility at first increased and afterwards deadened. When suppuration is established, the pain abates, rigors are felt, and fluctuation is evident, either through the lids or between the conjunctiva and the globe.

The treatment is similar to that of the same affection of the eyeball. The same danger to vision is to be apprehended, so that the same active antiphlogistic means are to be adopted. When suppuration is established, an early opening is to be made into the projecting point of the tumor, and the matter evacuated. Cases of this description are recorded, in which extension of the disease to the brain has been attended with apoplexy, and followed by death.

Tumors in the orbit.—All the various kinds of tumors are occasionally found in the orbit, such as indurated cellular texture, aneurism by anastomosis, hydatid, encysted, sarcomatous, &c. They cannot attain any size without being discovered, as they immediately produce, more or less, displacement of the eyeball, and injury to its functions. It is generally deemed advisable to remove these growths, in order to lessen deformity, and preserve or restore the integrity of the globe. If the tumor be seated in the upper part of the orbit, the incision is usually made just below the superciliary ridge, through the integuments, and the tumor dissected out; if in the lower portion of the orbit, the incision may be made through the conjunctiva. In the case of hydatids, a simple puncture has been known to succeed, the cysts escaping, and the tumor subsiding. In these cases vision is often lost, and the operation does not always restore it, although sometimes this is the case.*

The treatment of *Wounds*, in which the orbit may be punctured, does not differ from similar wounds elsewhere. Great mischief may ensue according to the parts which may be injured.

* Messrs. Travers and Dalrymple found it necessary to tie the carotid artery in two cases of aneurism by anastomosis, which they did successfully. *Med. Chir. Transactions*, vols. ii. and vi.

The *lacrymal gland* may become enlarged, and even schirrous, and may sometimes contain hydatids, producing so much irritation and deformity as to require its removal. It must be very difficult to discriminate while in the orbit, and can only be guessed at from the situation of the tumor. Occasionally the lacrymal gland is known to suppurate.

THE LACRYMAL PASSAGES.

In addition to the lacrymal gland and the caruncula lacrymalis, elsewhere mentioned, which secrete the fluid called tears, the lacrymal apparatus consists of the *puncta*, two very small capillary tubes, situated one in each eyelid, at its internal angle; they run in a direction towards each other, so as to form an intertriangular space, approximating at their entrance into the *lacrymal sac*. The lacrymal sac lies just under the tendon of the orbicularis muscle, and is lodged in a groove formed by the union of the os unguis and nasal process of the superior maxillary bone. It is a membranous bag of a somewhat oval shape. It communicates with the *nasal duct*, a canal which terminates in the nasal fossa, under the inferior turbinated bone. The whole of the lacrymal passages are lined by a continuation of the conjunctiva, which is plentifully supplied by mucous follicles.

The use of these various parts is simply that of a drain, to carry off the superfluous secretion from the conjunctiva.

DISEASES OF THE LACRYMAL PASSAGES.

Inflammation of the lacrymal sac.—Redness, tenderness, and swelling in the corner of the eye, over the lacrymal sac, with pain extending to the eye and nose, and discharge of tears and mucus from the inner angle of the eye, escaping over the cheek, form the symptoms of this disease.

The treatment consists of leeches over the inflamed parts, cold lotion, and purgatives.

Abscess of the lacrymal sac.—Most cases of inflammation of the lacrymal sac terminate in suppuration. The change is easily observed. The redness disappears, and is succeeded by pointing of the swelling, and, if left to itself, ulceration. When this change is observed, the cold applications should be changed to warm fomentations and poultices. The abscess should be early opened with a lancet, in order to prevent the extension of the suppuration, when a mixture of pus and mucus is evacuated, and the tumor subsides.

Fistula lacrymalis.—After inflammation and suppuration of the lacrymal sac may have subsided, we often find that there is an obstruction to the passage of the tears: a swelling is observed either occasionally, or it may be permanently, in the corner of the eye, the tears flowing over the cheek; and if the swelling be pressed, a mucopurulent fluid is pushed out through the puncta, which runs over the conjunctiva and down upon the face. Occasionally an aperture is left in the tumor, which does not heal, but admits through it a constant flow of the contents of the sac,—a fistulous aperture. The term fistula lacrymalis is more properly applied to this state, instead of being indiscriminately used, as it commonly is, in all cases of obstruction of the lacrymal passages. The obstruction is owing to a constriction of the nasal duct, the result of the morbid action described, and is most commonly found about the termination of the lacrymal sac in the nasal duct. In this condition of the parts, every now and then a fresh attack of inflammation and suppuration comes on, which is exceedingly troublesome and disagreeable. I have known the periods of attack to recur at the same time with menstruation. In some cases, however, no active inflammation or suppuration is observed,—the tumor remaining stationary, and the patient pressing out the con-

tents when much distended. Disease of the bones about the nasal portion of the orbit, or of the nose, will sometimes cause this complaint. In some cases the canal appears absolutely blocked up, and the bones imperforate; and this may be, either the result of disease, or congenital.

Treatment.—If there be any inflammation of the sac still remaining, means must be taken for its removal, as before described. If there be merely slight obstruction of the duct, the use of astringents may be tried, such as the solution of sulphate of zinc, or a weak solution of nitrate of silver. This plan will sometimes succeed. In the greater number of cases, however, it will be insufficient. It is then customary to perform an operation. A sharp pointed knife is introduced, in a perpendicular direction, into the sac and orifice of the nasal duct. The point where the two lacrymal canals unite and enter the sac, just over the tendon of the orbicularis, is the guide for the entrance of the knife. A probe is then passed into the duct, through the wound, to ascertain the nature of the obstruction, and is generally carried down into the nostril. This is removed, and a nail-headed style is commonly introduced in its place, which is allowed to remain. This must be worn for a considerable time, several months at least, and although it is generally productive of much benefit to the patient, it seldom

effects a complete cure, the constriction being very liable to return if the style be withdrawn. Instead of the nail-headed style, a small silver tube is, by some practitioners, made use of. It is introduced into the duct, and being broad at the top, lodges upon the edge of the orbit in the lacrymal sac, and the integuments quickly heal over it. There seems something objectionable in theory to this practice, but I have found no more irritation follow this plan than the other; and I have tried it with the best effect in cases where the style had been previously used without benefit; but it must also be stated, that it has occasionally failed. The absence of any deformity is probably its chief recommendation, the contrary of which is a great objection to the style. The tube is much used by Dupuytren, whose name it bears: it was, however, introduced into practice by Joubert. When the style is used, it is customary to remove it every two or three days, and to inject warm water through the duct into the nose. This appears to be a very unnecessary proceeding, and may be dispensed with. Sometimes considerable pain and swelling follow the operation, the latter of which often extends to the palpebræ, so as completely to close them for several days. All this however gradually subsides, and its subsidence may be promoted by cold lotions, bread and water poul-

tices, &c. Sometimes the swelling of the integuments is so considerable, that the head of the style will be buried and quite lost sight of for some days, so that if it is wished to draw it out, this will be attended with some difficulty, unless a piece of thread has been tied round its neck.

A fistulous aperture in the superciliary ridge is said to remain in some cases after inflammation and suppuration of the lacrymal gland, constituting another description of what is called fistula lacrymalis. Strumous abscesses in the orbit will sometimes leave a similar state.

Epiphora.—A watery state of the eye in which, particularly on exposure to cold, the tears flow over the cheek, instead of passing off through the puncta. It may be occasioned by simple irritation of the conjunctiva or lids, or by a constriction of the lacrymal canals or the nasal duct. It is distinguished from the previous affection by the absence of distension of the sac and mucous discharge. The use of mild stimulating applications may be adopted as most likely to remedy this inconvenience. It is however, often, but the prelude to the more serious obstruction of the nasal duct, which requires surgical interference. When it arises from constriction of the puncta, very fine probes are in use for their distension.

VOCABULARY.

Adenitis contagiosa palpebrarum [αδην, kernel, gland]. A name for purulent ophthalmia.

Aderhaut. [G. Ader, blood-vessel; haut, skin.] The German name for the choroid.

Adnata. G. Die angewachsene Haut. F. La conjonctive. The tunica conjunctiva.

Ægilops [αιξ, αιγος, a goat; ωψ, the eye]. Inflammatory swelling of the inner angle in a state of ulceration.

Albino [albus, white]. G. Albino. F. Albinoi. An individual wanting the pigmentum nigrum.

Albugo. G. Der weisse Staar. F. La taie. Dense opacity of the cornea.

Alopecia [αλωπηξ, a fox]. G. Verlust der Augenliederhaare. F. Alopécie. Loss of the cilia.

Amaurosis [αμαυροω, to darken]. G. Schwarzer Staar. F. Amaurose. Blindness from affection of the retina or optic nerve.

Amaurosis dimidiata. G. Der halbschwarze Staar. When half of the retina is paralyzed.

Amaurosis vaga. G. Der unstäte schwarze Staar. Amaurosis coming and going at irregular times.

Amblyopia [αμβλυς, dull; ωψ, eye]. G. Gesichtschwäche. F. Ambliopie. Impaired vision, weakness of sight.

Anchylops [αγχυλος, distorted; ωψ, eye]. G. Der Nasen-

winkelgeschwulst. F. Anchylops. An inflammatory swelling of the inner angle of the eye.

Anchyloblepharon [αγχυλον; βλεφαρον, eyelid]. G. Verwachsung der Augenliederränder unter sich. F. L'adhérence des paupières. A preternatural adhesion of the two eyelids.

Angle. G. Augenwinkel. F. Angle de l'œil. The point of union between the eyelids.

Anterior Chamber. G. Die vordere Kammer. F. La chambre antérieure. The space occupied by the aqueous humour behind the cornea and in front of the iris.

Aqua Morgagni. G. Morganische Feuchtigkeit. F. L'humeur de Morgagni. A minute portion of fluid contained in the capsule of the lens.

Aqueous humour. G. Wasserfeuchtigkeit. F. L'humeur aqueuse. The clear fluid occupying the anterior chamber.

Aquo-capsulitis. G. Wasserkapselentzündung. F. Inflammation de la capsule de l'humeur aqueuse. Inflammation of the capsule of the aqueous humour.

Arcus senilis. G. Die greise Trübung. An opaque circle around the circumference of the cornea, occurring in elderly persons.

Atonia palpebrarum. Atoniaton blepharon. G. Erschlaffung der Augenlieder. F. Atonie des paupières. Relaxation of the eyelids.

Atresia iridis perfecta [α, priv.; τρεω, to perforate]. G. Vollkommene Verwachsung der Pupille. F. Clôture entière de la pupille. Complete closure of the pupil.

Atresia iridis imperfecta. G. Unvollkommene Verwachsung der Pupille. F. Clôture imparfaite de la pupille. Partial closure of the pupil.

Atrophia [α, priv.; τροφη, nourishment]. G. Auszehrung des Augapfels. F. Atrophie de l'œil. Atrophy or absorption of the eyeball.

Bibitorius. G. Trinkmuskel. F. Adducteur de l'œil. A name formerly given to the adductor muscles of the globe, because in drinking the eyes are turned inwards for viewing the drink.

Blenorrhœa [βλεννα, mucus; ρεω, to flow]. G. Schleimfluss. F. Blenorrhée. Purulent ophthalmia.

Blenorrhœa sacci lacrymalis. G. Thränensacktripper. F. Blenorrhée du sac lacrymal. Inflammation of the lacrymal sac with copious discharge.

Blephara [βλεφαρον, βλεπω, to see]. G. Augenlied, Augendeckel. F. Les paupières. The eyelids.

Blepharides [βλεφαρις, ιδος, eyelash]. G. Augenliederknorpel. F. La marge ciliaire. The cartilaginous edges of the eyelids.

Blepharoitis, &c. [βλεφαρον, eyelid]. G. Contagiöse Augenliederdrüsenentzündung. F. Blepharoite. Purulent ophthalmia.

Blepharoitis. Blepharophthalmitis. Blepharitis idiopathica. G. Idiopatische Augenliederentzündung. F. Blepharophtalmie idiopathique. Inflammation of the eyelids.

Blepharo-blenorrhœa. G. Augenliedtripper. F. Blenorrhée des paupières. Purulent ophthalmia.

Blepharophthalmia [βλεφαρον-οφθαλμια]. G. Augenliederentzündung. F. Blepharophtalmie. Gonorrhœal ophthalmia.

Blepharophthalmia ulcerosa. G. Geschwüraugenliederentzündung. F. Blepharophtalmie ulcérée. Inflammation of the eyelids with ulceration.

Blepharophthalmitis glandulosa. G. Augenliederdrüsenentzündung. F. Blepharophtalmie glanduleuse. Infantile purulent ophthalmia.

Blepharoplegia [βλεφαρον, eyelid; πληγη, stroke or blow (paralysis)]. G. Lähmung des Aufhebers des obern Augenliedes. F. Blepharoplégie. Paralysis of the levator palpebræ.

Blepharoptosis [βλεφαρον, πτωσις, a falling]. G. Verfall des obern Augenliedes. F. Chûte de la paupière supérieure. Falling of the upper lid.

Blepharoxysis [βλεφαρον, eyelid; ξυω, to scrape]. Cleaning the eyes with a brush.

Blepharoxystron [βλεφαρον, eyelid; ξυστρον, a scraping instrument]. Instrument for examining the eyes.

Cæcitas diurna. G. Tagblindheit. F. Cécité diurne. Day blindness.

C. nocturna. G. Nachtblindheit. F. Cécité nocturne. Night blindness.

Caligo tenebrarum. G. Nachtblindheit. F. Aveuglement de nuit. Night blindness.

Canal of Petit. G. Der Petitsche Kanal. F. Canal de Petit. A space surrounding the lens between it and the tunica hyaloidea.

Canthus [χανθος, corner of the eye]. G. Augenwinkel. F. La commissure interne. The point of union of the eyelids, external and internal.

Capsule. G. Linsenkapsel. F. Capsule du crystallin. The name of the membrane which surrounds and encloses the lens.

Capsulitis. G. Kapselentzündung. F Inflammation de la capsule du crystallin. Inflammation of the capsule of the lens.

Caruncula lacrymalis. G. Thränenkarunkel. F. Caroncule lacrymale. A small prominent body in the inner angle of the eye, of a glandular structure.

Caruncula maligna. See *Papula maligna.*

Cataracta [καταρασσω, to hurl down; κατα and ρηγνυμι, to break]. G. Der graue Staar. F. Cataracte. Cataract. Opacity of the lens.

C. arborescens. G. Baumförmiger Staar. Deposition on

the capsule of the lens of the colouring matter of the uvea.

C. arida siliquata. G. Trockenhülsiger Staar. Tough capsular or dry-shelled cataract.

C. capsularis. G. Kapselstaar. F. La cataracte capsulaire. Opacity of the capsule of the lens.

C. capsulo-lenticular. G. Kapsellinsenstaar. F. Cataracte capsulo-lenticulaire. Opacity of both lens and capsule.

C. capsulo-lenticular. c. bursâ, &c. G. Kapsellinsenstaar mit dem eiterbalge. Cataract in which a cyst of fetid matter is found between the lens and capsule.

C. capsulo-lentic. cum zonâ. G. Gegürteter Kapsellinsenstaar. A thick opaque bar stretching across the pupil, adherent to the uvea.

C. caseosa. G. Käsigte graue Staar. F. Cataracte caseuse. Cataract of a cheesy consistence.

C. centralis. G. Centrallinsenstaar. F. Cataracte centrale. Opacity of the nucleus of the lens.

C. choroidalis. G. Aderhautstaar. Deposition on the capsule of the lens of the colouring matter of the uvea.

C. dentritica. G. Falsche Staar. Lymphaustretung in den pupille. False cataract, from effusion of lymph into the pupil.

C. dimidiata. G. Halbstaar. F. Une demie cataracte. Half of the capsule opaque.

C. dura. G. Harter Staar. F. Cataracte dure. Hard cataract.

C. fenestrata. G. Gitterförmige Staar. Opacity of the capsule having the shape of bars.

C. fluida. G. Flüssiger Staar. F. Cataracte fluide. Fluid cataract.

C. fluida dura. G. Der flüssigharte Staar. Hard nucleus with fluid circumference of the opaque lens.

C. gelatinosa. G. Der gallertartige Staar. F. Cataracte gélatineuse. Cataract of the consistence of jelly.

C. grumosa. G. Der geronne Staar. F. Cataracte grumeleuse. False cataract from effusion.

C. gypsea. G. Der gypsartige Staar. F. Cataracte gypseuse. Change of the capsule to a chalky substance.

C. lactea. G. Der milchstaar. F. Cataracte laiteuse. Milky cataract.

C. lenticularis. G. Der Linsenstaar. F. Cataracte du crystallin. Opacity of the lens simply.

C. lymphatica. G. Der Lymphstaar. F. Cataracte lymphatique. False cataract from effusion of lymph into the pupil.

C. marmoracea. G. Der marmorirte Staar. F. Cataracte marbrée. Capsular cataract, having a marbled appearance.

C. matura. G. Der reife Staar. F. Cataracte mûre. Ripe cataract.

C. immatura. G. Der unreife Staar. Unripe cataract.

C. membranacea. G. Der häutige Staar. F. Cataracte membraneuse. False cataract from effusion of lymph into the pupil.

C. Morganiana. G. Der Morganische Staar. F. Cataracte de Morgagni. Opacity of the aqua Morgagni.

C. natatalis. G. Der schwimmende staar. F. Cataracte flottante. Swimming or floating cataract.

C. nigra. G. Der schwarze Staar. F. Cataracte noire. Amaurosis.

C. punctata. C. stellata. G. Der punctirte Staar. F. Cataracte tachée. Opacity of the capsule having a spotted appearance.

C. purulenta. G. Eiterstaar. F. Cataracte purulente. False cataract from effusion.

C. pyramidalis. G. Der kegelförmige Staar. F. Cataracte

pyramidale. A dense pyramidal mass projecting into the pupil.

C. siliquosa. G. Hülsiger Staar. Opacity of the capsule with a shrivelled appearance.

C. striata. G. Streifstaar. F. Cataracte striée. Opacity of the capsule with a streaked appearance.

C. tenax. G. Der zähe graue Staar. Firm cataract.

C. trabecularis [trabecula, a little beam]. G. Der Balkenstaar. F. Cataracte barrée. A thick opaque bar stretching across the pupil, adherent to the uvea.

C. tremula. G. Der Zitterstaar. F. Cataracte tremblante. Shaking cataract.

C. variegata. G. Der vielfarbige Staar. F. Cataracte bigarrée. Capsular cataract of a variegated appearance.

Catarrhal ophthalmia. G. Die catarrhalische Augenentzündung. F. Ophtalmie catarrhale. Inflammation of the conjunctiva with increased mucous discharge.

C. rheumatic ophthalmia. G. Rheumatische Augenentzündung. F. Ophtalmie rheumatismale. When the above extends to the sclerotica.

Ceratitis. G. Hornhautentzündung. F. Inflammation de la cornée. Inflammation of the cornea.

Ceratocele [κερας, ατος, horn (cornea); κηλη, tumor]. G. Hornhautbruch. F. Cératocèle. Protrusion of the membrane of the aqueous humor through an ulcer of the laminæ of the cornea.

Ceratotome [κερας, ατος; τομη, cutting]. G. Hornhautmesser. F. Cératotome. A cornea knife.

Chalazion [χαλαξη, hail]. G. Hagelkorn. F. La grêle des paupières. Small hard tumor of the palpebral margin like hail.

Chemosis [χυμος, a flowing]. G. Die Chemosis. F. Chémosis. Inflammatory distension and effusion of the whole of the conjunctiva covering the globe.

Choroid. G. Aderhaut. F. La choroïde. The dark coloured, delicate, and very vascular membrane lying between the sclerotica and retina.

Choroiditis. G. Aderhautentzündung. F. Inflammation de la choroïde. Inflammation of the choroid.

Chrupsia [χρως, colour; ωψ, eye]. See *Visus coloratus.*

Cilia. G. Augenwimper. F. Cils. The eyelashes.

Ciliary ducts. G. Augenwimpergänge. F. Les conduits ciliaires. Apertures in the ciliary margin for the transmission of the secretion of the Meibomian glands.

Ciliary ligament. G. Strahlenband. F. Ligament ciliaire. The dense white medium which unites the choroid and sclerotic anteriorly and the point of union between these and the iris, cornea, &c.

Ciliary margin. G. Augenliederknorpel. F. La marge ciliaire. The outer margin of the eyelids at the junction of the mucous membrane with the skin.

Ciliary processes. G. Strahlen-falte. F. Procès ciliaires. The anterior portion of the ciliary body, consisting of an alternation of black and white folds.

Cirsophthalmia [κιρσος, a varicose vein; οφθαλμια]. G. Varicosität des Augapfels. F. Cirsophtalmie. A varicose state of the vessels of the globe.

Clavus [the head of a nail]. G. Nagelkopf. F. Clou. Large protrusion of the iris through the cornea.

Collyrium. G. Augenwasser. F. Collyre. A lotion for the eye.

Coloboma iridis [κολοβοω, to mutilate]. G. Regenbogenhautspalt. F. Colobôme de l'iris. A fissure in the lower portion of the iris producing a triangular pupil.

Coloboma palpebrarum. G. Augenliedspalt. F. Colobôme de la paupière. A fissure in the palpebra, resembling hare lip.

Congenital. G. Mitgeboren. F. Né ensemble. Original, born with.

Conical cornea. G. Kegelförmige Hornhaut. F. La cornée conique. A disease in which the cornea becomes pointed and projecting at its centre.

Conjunctiva. G. Bindehaut. F. Conjonctive. The mucous membrane that lines the eyelids and is reflected upon the globe.

Conjunctivitis catarrhalis. G. Die catarrhalische Bindhautentzündung. F. Inflammation catarrhale de la conjonctive. Catarrhal ophthalmia.

Conjunctivitis contagiosa, &c. G. Die contagiöse Augenentzündung. F. Inflammation contagieuse de la conjonctive. Purulent ophthalmia.

Conjunctivitis psorica. G. Psorische Bindhautentzündung. F. Inflammation psorique de la conjonctive. Tinea of the eyelids.

Considentia or subsidentia pupillæ. G. Das Zusammenfallen der Pupille. F. Cloison de la pupille. Collapse or closure of the pupil.

Consumptio purulenta oculi. G. Die eiterige Auszehrung des Augapfels. F. Consomption purulente de l'œil. Diminution of the globe from suppuration.

Coredialysis. Coretodialysis. Corodialysis [κορη, pupil; διαλυσις, separation]. Vide *Iridodialysis.* The formation of an artificial pupil by separation from the ciliary margin.

Coremorphosis [κορη, pupil; μορφωσις, formation]. G. Die künstliche Pupillengestaltung. F. L'opération de former une pupille artificielle. The formation of an artificial pupil.

Coretotomia. Corotomia [κορη, pupil; τομη, incision]. G. Einschneidung der Regenbogenhaut. F. L'opération de former une pupille artificielle par incision. The formation of an artificial pupil by incision.

Cornea or Cornea lucida. G. Die durchsichtige Hornhaut. F. Cornée. The anterior transparent boundary of the globe.

Cornea opaca. G. Die undurchsichtige Hornhaut. F. La cornée opaque. A name sometimes given to the sclerotica from its resemblance to the cornea in most respects except transparency.

Corneitis. G. Hornhautentzündung. F. Inflammation de la cornée. Inflammation of the cornea.

Corona or Zona ciliaris. G. Die Ciliarkrone. F. La couronne ciliaire. The impression stamped on the vitreous humor by the ciliary processes.

Corpus ciliare. Ciliary body. G. Ciliarkörper. F. Corps ciliaire. The anterior part of the choroid, near its junction with the iris, consisting of a black ring, about three lines broad, surrounding the lens.

Couching. G. Niederdrückung des Staares. F. Dépression de la cataracte. The operation of depressing a cataract.

Crusta lactea. G. Milchschorf. F. La croûte laiteuse. A pustular disease affecting the palpebræ, &c.

Crystalline humor or *lens.* G. Glassfeuchtigkeit. F. Le crystallin. The transparent, somewhat firm body situated immediately behind the iris and pupil, and in front of the vitreous humor.

Curette. G. Augenlöffel. F. Curette. A scoop for extracting portions of the lens.

Cuticular conjunctiva. G. Die hautartige Bindehaut. F. La conjonctive cutanée. Dryness of the conjunctiva.

Cystitome [κυστις, a bladder or cyst; τομη, incision]. An instrument for opening the capsule of the lens.

Dacryacystitis. G. Thränensackentzündung. F. Inflammation du sac lacrymal. Acute inflammation of the lacrymal sac.

Dacryoma [δακρυω, to weep]. G. Undurchdringlichkeit der Thränenpuncte. An impervious state of the puncta lacrymalia.

Dacryops. G. Thränensackgeschwulst. F. Tumeur lacrymale. Swelling of the lacrymal sac.

Diplopsia [διπλους, double; οψις, sight]. G. Doppeltsehen. F. Vue double. Double vision.

Distichiasis [δις, twice; στιχος, a row]. Double row of cilia.

Dysopia tenebrarum [δυς, implying difficulty or privation; οψις, sight]. G. Nachtblindheit. F. Aveuglement de nuit. Night blindness.

Ecchymosis [εκ, out; χεω, to flow]. Partial effusion of blood under the conjunctiva.

Ectropium [εκ; τρεπω, to turn]. G. Ausstülpung des Augenliedes. F. Ectropion. Eversion of the eyelids.

Egyptian ophthalmia. G. Ægyptische Augenentzündung. F. Ophtalmie d'Egypte. Purulent ophthalmia.

Empyesis oculi [εν; πυον, pus]. G. Die Eiterung des Augapfels. F. Empyème de l'œil. Effusion of matter before and behind the iris. Suppuration of the globe.

Encanthis [εν, in; κανθος]. G. Thränenkarunkelgeschwulst. F. Encanthis. Enlargement of the caruncula lacrymalis.

Entropion [εν; τρεπω, to turn]. G. Die Einstülpung des Augenliederrandes. F. Entropion. Inversion of the eyelids.

Epicanthis [επι, upon; κανθος, angle of the eye]. A preternatural fold of skin projecting over the internal canthus.

Epiphora [επι, upon; φερω, to bring]. G. Thränenfluss. F. Epiphore. Watery eye.

Erysipelatous ophthalmia. G. Rosenartige Augenentzündung. F. Ophtalmie érysipélateuse. Erysipelatous inflammation of the palpebræ and conjunctiva.

Exophthalmia [εξω, out; οφθαλμος, eye]. G. Vorfall des Augapfels. F. Exophtalmie. Protrusion of the globe between the eyelids.

Extraction. G. Staarausziehung. F. L'extraction de la cataracte. The operation for removal of an opaque lens through an incision of the cornea.

Fistula lacrymalis. G. Thränenfistel. F. Fistule lacrymale. Suppuration of lacrymal sac with ulceration.

Fossa hyaloidea [ὑαλο-ειδης, resembling crystal]. The depression in the tunica hyaloidea for the reception of the lens.

Fungus hæmatodes. G. Der Blutschwamm. F. Fongus hématode. Bleeding fungus, a malignant affection of the globe.

Gerontoxon [γερων, old; τοξον, a bow]. Arcus senilis.

Glaucoma [γλαυκος, sea-green]. G. Trübung des glaskörpers. F. Glaucôme. A diseased state of the eye, attended with a dull green colour of the pupil.

Gonorrhœal ophthalmia. G. Die gonorrhoische Augenentzündung. F. Ophtalmie gonorrhoïque. Purulent ophthalmia, concurrent with or following gonorrhœa.

Granulations. G. Körnen. F. Granulations. Roughness of the conjunctiva, a consequence of inflammation.

Gutta serena. G. Der schwarze Staar. F. Goutte sereine. Confirmed amaurosis.

Hæmophthalmia [αιμα, blood; οφθαλμος, eye]. G. Blutaustretung in den Auge. F. Effusion de sang dans l'œil. Effusion of blood within the eye.

Hemeralopia [ἡμἱρα, day; αλαος, blind; ωψ]. G. Nachtblindheit. F. Aveuglement de nuit. Night blindness.*

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* This term is applied more correctly, by some authors, to day blindness.

Hemiopsia [ἡμι, half; ὀψις, vision]. G. Halbgesicht. F. Demie vue. Partial impairment of the retina.

Hernia corneæ. G. Hornhautbruch. F. Hernie de la cornée. Protrusion of the capsule of the aqueous humor through an ulcer of the cornea.

Hernia sacci lacrymalis. G. Thränensackbruch. F. Hernie du sac lacrymal. The escape on pressure of mucous discharge from the puncta or nasal duct.

Hippus pupillæ [ἱππος, a horse]. A fluttering state of the pupil, between contraction and dilatation.

Hordeolum. G. Gerstenkorn. F. L'orgeolet. An inflammatory tumor on the palpebral margin.

Hyalitis. G. Die glasfeuchtige hautsentzündung. F. Inflammation de la membrane hyaloide. Inflammation of the hyaloid membrane.

Hydrophthalmia. Hydrophthalmos. Hydrops oculi [ὑδωρ, water; ὀφθαλμος, eye]. G. Augenwassersucht. F. Hydrophtalmie. Dropsy of the globe of the eye.

Hydrophthalmia anterior. G. Wassersucht der vordern Kammer. F. L'hydropsie de la chambre antérieure de l'œil. Dropsy of the anterior chamber.

Hydrops sacci lacrymalis. G. Thränensack-wassersucht. F. L'hydropsie du sac lacrymal. Distension without suppuration of the lacrymal sac.

Hypoema scorbuticum. G. Das scorbutische Blutauge. F. L'ophtalmie par principe scorbutique. Scorbutic inflammatory state of the eye.

Hypogala [ὑπο, under; γαλα, milk]. G. Milchaustretung in die vordere Augenkammer. F. Effusion d'une fluide laiteuse dans la chambre antérieure. Effusion of a milky fluid into the eye.

Hypolympha. G. Lymphaustretung. F. Effusion de lymphe dans la chambre antérieure. Effusion of lymph into the anterior chamber.

Hypopium or *Hypopion* [ὑπο under; πυον, pus]. G. Eitersammlung in der vordern Augenkammer. F. Effusion de pus dans la chambre antérieure. Effusion of pus in the anterior chamber.

Imperforatio pupillæ. G. Undurchlöchertung der pupille. F. Imperforation de la pupille. A continuance of the membrana pupillaris.

Iris. G. Regenbogenhaut. F. L'iris. The beautifully coloured membrane which stretches across the globe internally, and divides it into two chambers.

Iridectomedialysis [ιρις, ιδος, iris; εκτομη, excision; διαλυσις, separation]. G. Die künstliche Pupillengestaltung durch Lostrennung und ausschneiden der Regenbogenhaut. F. L'opération de former une pupille artificielle par la séparation et la taille de l'iris. The operation for artificial pupil, by separation and excision of the iris.

Iridencleisis [ιρις, ιδος; εγκλειω, to enclose]. Strangulation of a detached portion of iris in a wound of the cornea produced artificially.

Iridodialysis [ιρις, ιδος; διαλυσις]. G. Die Lostrennung der Iris vom Ciliarbande. F. La séparation de l'iris de la marge ciliaire. Formation of an artificial pupil by separation from the ciliary margin.

Iridotomia [ιρις, ιδος; τομη, cutting]. G. Einschnitt der Regenbogenhaut. F. Incision de l'iris. Formation of an artificial pupil by incision.

Iritis. Iriditis. G. Regenbogenhautentzündung. F. Inflammation de l'iris. Inflammation of the iris.

Keratitis. G. Hornhautentzündung. F. Inflammation de la cornée. Inflammation of the cornea.

Kerato-iritis. G. Hornhautregenbogenhautentzündung.

F. Inflammation de la capsule de l'humeur aqueuse. Inflammation of the capsule of the aqueous humor.

Keratonyxis [κερας, ατος, horn (cornea); νυξις, a puncture]. G. Zerstücklung des Staares durch die Hornhaut. F. La keratonixis. An operation for solution of cataract, in which the needle is passed through the cornea and pupil.

Koretomia [κορη, pupil; τομη, cutting]. *Vide* Iridotomia. Formation of an artificial pupil by incision.

Lacrymal. G. Thränenerzeugend. F. Lacrymal. Relating to the tears.

Lacrymal canals or *ducts.* G. Thränenkanalchen—Thränengänge. F. Les conduits lacrymaux. The tubes which convey the tears into the lacrymal sac.

Lacrymal gland. G. Thränendrüse. F. La glande lacrymale. The gland which secretes the tears.

Lacrymal sac. G. Thränensack. F. Le sac lacrymal. The reservoir for the tears communicating with the lacrymal canals and nasal duct.

Lagophthalmos [λαγως, a hare; οφθαλμος, eye]. G. Hasenauge. F. Œil de lièvre. Shortening of the upper lid.

Lapsus palpebræ superioris. G. Verfall des obern Augenliedes. F. Chûte de la paupière supérieure. Falling of the upper lid.

Lentitis. G. Linsenentzündung. F. Inflammation du crystallin. Inflammation of the crystalline lens.

Leucoma [λευκος, white]. G. Verdunkelung der Hornhaut. F. Leucome. Dense opacity of the cornea.

Lippitudo. G. Augeneitertriefen. F. Lippitude. Ulceration of the ciliary margin of the eyelids.

Lippitudo pruriginosa. G. Krässiges Augentriefen. F. Grattelle sêche des paupières. Chronic inflammation of the eyelids with itching.

Luscitas. G. Schiefsehen. A fixed, immoveable condition of the eye from paralysis.

Macula. G. Fleck in der Hornhaut. F. Tache sur la cornée. A small speck on the cornea.

Macula lutea. G. Gelbfleck in der Netzhaut. F. La tache jaune sur la retine. A yellow spot in the retina near the papilla conica.

Madarosis [μαδαω, to lose the hair]. G. Verlust der Augenwimpern. F. La chûte des cils. Loss of the cilia.

Meibomian glands. G. Die Meibomischen Drüsen. F. Les glandes de Meibomius. Small glands which lie under the mucous membrane of the eyelids.

Melanosis [μελανοω, to blacken]. F. Melanose de l'œil. Black fungus, a malignant disease of the eye.

Membrana hyaloidea or *vitrea.* G. Die glasfeuchtige Haut. F. La membrane hyaloïde. The membrane of the vitreous humor.

Metamorphopsia [μεταμορφοω, to transform; ωψ, the eye]. G. Das Ungestaltetsehen. F. Métamorphopsie. Confused or distorted appearances seen by amaurotic persons.

Millium. G. Hirsenkorn. F. Millet. A small white tumor on the margin of the lids.

Monoculus. Monophthalmos [μονος, one; οφθαλμος, eye]. G. Einäugig. F. Monocule. Having only one eye. A bandage for the eyes.

Motores oculorum. G. Die Beweger der Augen. Das dritte Paar. F. Les moteurs des yeux. The third pair of nerves.

Mot. ocul. ext. G. Die ausserlichen Beweger der Augen. Das sechste Paar. F. Les moteurs externes des yeux. The sixth pair of nerves.

Muscæ volitantes. G. Mückensehen. F. Mouches vo-

lantes. Appearance of floating or moving bodies before the eyes from affection of the retina.

Mycocephalon [μυια, a fly; κεφαλον, head]. G. Mückenkopf. F. Mycocéphalon. A small prolapsus iridis, the size of a fly's head.

Mydriasis [μυδαω, to be humid or damp]. G. Erweiterung der Pupille. F. Dilatation de la pupille. Unnatural dilatation of the pupil.

Myodesopia [μυωδης, resembling mice; ωψ, eye]. G. Mückensehen. F. Taches noires. Appearance of floating or moving bodies before the eyes from affection of the retina.

Myopia [μυω, to shut; ωψ, the eye]. G. Kurzsichtigkeit. F. La myopie. Near-sightedness.

Myosis [μυω, to shut; ωψ]. G. Verengerung der Pupille. F. Myosie. Unnatural contraction of the pupil.

Nasal duct. G. Nasengang. F. Conduit nasal. The passage from the lacrymal sac into the nose.

Nebula. G. Nebeligkeit der Hornhaut. F. Nuage de la cornée. Cloudy opacity of the cornea.

Nictitatio. G. Blinzauge. F. Clignotement. An involuntary blinking of the eyelids.

Nistagmus. G. Unwillkührliche pendülartige Rotation des Augapfels. F. Nystagme. An involuntary pendulum-like rolling of the eyeball.

Nucleus. G. Kern der Linsen. F. Noyau du crystallin. The central portion of the lens.

Nyctalopia [νυξ, νυκτος, night; αλαος, blind; ωψ, eye: hence strictly means night blindness]. G. Tagblindheit. F. Aveuglement de nuit. Day blindness.

Obliqui. G. Die schiefen Augenmuskeln. F. Les muscles obliques de l'œil. The name of two muscles of the eye.

Oculus. Omma. G. Auge. F. Œil. The eye.

Oculus bovinus. O. bubulus. G. Ochsenauge. F. Œil-de-bœuf. Enlarged eye from disease.

Oculus elephantinus. G. Der elephantische Auge. F. Œil d'éléphant. Ditto.

Oculus leporinus. G. Hasenauge. F. Œil-de-lièvre. Shortening of the upper eyelid.

Onyx [ὄνυξ, a nail]. G. Nagel der Hornhaut. F. Onice. Deposition of matter between the laminæ of the cornea, falling to the bottom, and resembling the appearance at the root of the nails.

Ophthalmia. G. Augenentzündung. F. Ophtalmie. Inflammation of the eye.

O. angularis. G. Augenwinkelentzündung. F. Inflammation angulaire de l'œil. Inflammation in the corner of the eye.

O. bellica. O. contagiosa. G. Ansteckende Augenentzündung. Ophtalmie contagieuse. Purulent ophthalmia.

O. catarrhalis. G. Katarrhalische Augenentzündung. F. Ophtalmie catarrhale. Catarrhal ophthalmia.

O. gonorrhoica vera. G. Gonorrhoische Augenentzündung. F. Ophtalmie gonorrhoïque. Gonorrhœal ophthalmia.

O. levis or *mitis. O. taraxis* [ταρασσω, to disturb]. G. Milde Augenentzündung. F. Ophtalmie fausse ou légère. Mild ophthalmia.

O. morbillosa. G. Morbillöse Augenentzündung. F. Ophtalmie accompagnée de la rougeole. Inflammation of the eye attending measles.

O. mucosa. G. Schleimaugenentzündung. F. Ophtalmie muqueuse. Catarrhal ophthalmia.

O. neonatorum [νεος, new; natus, born]. G. Augenentzündung der Neugebornen. F. Ophtalmie des enfants nouveau nés. Purulent ophthalmia in new-born infants.

O. porriginosa. G. Schorfkopfaugenentzündung. F. Ophtalmie accompagnée de la teigne. Inflammation of the eye attending porrigo larvalis.

O. psorica. G. Psorische Augenentzündung. F. Ophtalmie ulcérée. Inflammation of the eyelids, with ulceration.

O. purulenta. G. Eiteraugenentzündung. F. Ophtalmie purulente. Purulent ophthalmia.

O. scarlatinosa. G. Skarlatinöse Augenentzündung. F. Ophtalmie accompagnée de la fièvre scarlatine. Inflammation of the eye attending scarlatina.

O. serosa. O. humida. G. Feuchte Augenentzündung. F. Ophtalmie sereuse. Erysipelatous ophthalmia.

O. sicca. O. tracoma [τραχυς, rough]. G. Trockene Augenentzündung. F. Ophtalmie sèche. Inflammation with dryness of the conjunctiva.

O. a synechiá. G. Die unterbrochene Augenentzündung. Intermitting ophthalmia.

O. tarsi. G. Knorpelaugenentzündung. F. Ophtalmie du tarse. Inflammation of the eyelid.

O. variolosa. G. Variolöse Augenentzündung. F. Ophtalmie varioleuse. Inflammation of the eye attending smallpox.

Ophthalmic. G. Die augen betreffend. F. Ophtalmique. Relating to the eye.

Ophthalmicus Willisii. A branch of the fifth pair of nerves.

Ophthalmitis. Inflammation of the globe.

Ophthalmitis conjunctivitis catarrhalis. G. Catarrhalische Entzündung der Bindehaut des Augapfels. Catarrhal inflammation extending from the conjunctiva to the globe.

Ophthalmitis interna idiopathica. O. posterior totalis. G. Die innere idiopatische Augapfelentzündung. F. L'ophtalmie interne. Inflammation of the internal tunics of the eye.

Ophthalmo-blenorrhœa. G. Augentripper. F. Ophtalmie gonorrhoïque. Purulent inflammation affecting the conjunctiva of the palpebræ and globe.

Ophthalmodynia [οφθαλμος; οδυνη, pain]. G. Schmerz des Augapfels. F. Douleur à l'œil. Violent pain of the eyeball.

Ophthalmographus [οφθαλμος; γραφω, to write]. G. Schriftsteller von den Augenkrankheiten. F. Un écrivain sur les maladies des yeux. A writer on the eye.

Ophthalmology [οφθαλμος; and λογος, a discourse]. G. Lehre vom Auge. F. Ophtalmologie. The science of medicine in relation to the eye.

Ophthalmoponia [οφθαλμος; πονος, pain]. G. Schmerz im Auge. F. Douleur à l'œil. Intense pain in the eye.

Ophthalmoplegia [οφθαλμος; πληγη, a blow, paralysis]. G. Lähmung des Aufhebers des Augenliedes. Paralysis of the levator palpebræ.

Ophthalmoptosis [οφθαλμος; πτωσις, a falling]. G. Vorfallung des Augen aus der Augengrube. F. Ophtalmoptosis. Protrusion of the globe between the lids.

Ophthalmorrhagia [οφθαλμος; ρηγνυμι, to break out]. G. Blutfluss vom Auge. F. Ophtalmorrhagie. Bleeding from the eye.

Ophthalmos [οπτω, to see]. G. Auge. F. Œil. The eye.

Ophthalmoxysis [οφθαλμος; ξυω, to scrape]. Cleaning the eyes with a brush.

Ophthalmoxystrum [όφθαλμος; ξυστρον, a scraping tool.] A brush for the eyes.

Opsis [οπτω, to see]. G. Gesichte. F. La vue. The eye. Vision.

Optometer [οπτω, to see; μετρον, measure]. An instrument for measuring the limits of distinct vision.

Orbit. G. Augenhöhle. Augengrube. F. L'orbite. The bony cavity which lodges and defends the eyeball.

Oxyopia. [οξυς, sharp; ωψ, eye]. G. Das Scharfsehen. Acuteness of sight.

Pachea blephara. Pachytes. Pachyblepharon [παχυς, thick; βλεφαρον, eyelid]. G. Augenliedesschwellen. F. Endurcissement des paupières. Enlargement and thickening of the eyelids.

Palpebræ. G. Augenlied. F. Paupières. The eyelids.

Papula maligna. G. Der bosärtige Knoten. F. La papule maligne. A malignant tubercle affecting the ciliary margin, conjunctiva, &c.

Periorbita. G. Augenhöhlbein Haut. F. Perioste orbitaire. The serous membrane lining the orbit.

Phlyctenæ or *Phlyctenulæ.* G. Wasserbläschen. F. Les phlyctenes. Vesicles containing a watery fluid.

Photophobia [φως, φωτος, light; φοβεω, to dread]. G. Lichtscheue. F. Photophobie. Intolerance or dread of light.

Photopsia. Photophobia [φως, light; οψις, sight.] G. Lichterscheinung. F. Bluettes. Luminous appearances seen in amaurosis.

Pigmentum nigrum. G. Der schwarze Schleim. F. L'humeur noire. The colouring matter of the choroid.

Porrigo larvalis. G. Der Schorfkopf. F. Teigne muqueuse. Pustular eruption affecting the eyelids.

Porriginous ophthalmia. G. Schorfaugenentzündung. F. Ophtalmie porrigineuse. Inflammation of the eye attended with porrigo larvalis.

Posterior chamber. G. Die hintere kammer. F. La chambre postérieure. The part of the eyeball behind the iris.

Presbyopia [πρεσβυς, old; ωψ, eye]. G. Ferngesicht. F. Presbytie. Farsightedness.

Prolapsus iridis. Procidentia iridis. G. Vorfall der Regenbogenhaut. F. La chûte et la procidence de l'iris. The

passage of a portion of the iris through an aperture of the cornea.

Proptosis [προ, forward; πτοω, to fall]. G. Das Vorfallen des Augapfels. F. Proptose de l'œil. Protrusion of the globe between the lids.

Psorophthalmia [ψωρα, the itch; οφθαλμος]. G. Psorische Augenentzündung. F. Gale des paupières. Inflammation of the eyelids.

Pterygium [πτερυξ, a wing]. G. Flügelfell. F. Ptérygion.

Pteryg. pingue. G. Fettfell. A thickening of the conjunctiva of a triangular shape passing to the cornea.

Ptheiriasis. Pediculi ciliorum. G. Läuse in den Augenliederhaaren. F. La maladie pédiculaire des cils. Lice attached to the eyelashes.

Ptilosis [πτιλωσις, literally the moulting of birds: πτιλοω, obsolete]. G. Verlust der Augenliederhaare. F. La chûte des cils. Loss of the eyelashes.

Ptosis [πτοω, to fall]. G. Verfall des obern Augenliedes. F. La chûte de la paupière supérieure. Falling of the upper lid.

Puncta lacrymalia. G. Thränendrüsenhaaröffnung. F. Points lacrymaux. The orifices of the lacrymal canals.

Pupil. G. Das Seheloch. F. Pupille. The central aperture in the iris.

Purulent ophthalmia. G. Eiterige Augenentzündung. F. Ophtalmie purulente. Inflammation of the conjunctiva with purulent discharge.

Pustular ophthalmia. G. Blatteraugenentzündung. Inflammation with pustules of the conjunctiva.

Reclination. G. Die Umlegung des Staares. F. Réclinaison. A particular mode of depressing cataract.

Recti. G. Gerade Augenmuskeln. F. Les muscles droits

de l'œil. The names of the four straight muscles which move the globe.

Retina. G. Netzhaut. F. Rétine. The expansion of the optic nerve around the posterior chamber of the eye.

Retinitis. G. Netzhautentzündung. F. Inflammation de la rétine. Inflammation of the retina.

Rheumatic ophthalmia. G. Rheumatische Augenentzündung. F. Ophtalmie rheumatismale. Inflammation of the sclerotic coat, caused by exposure to cold.

Rhexis or *Rhegma oculi* [ρηγμα, a rupture]. G. Das Bersten des Augapfels. F. Rupture du globe de l'œil. Bursting of the eyeball.

Rhytidosis [ρυτις, ιδος; ερυω, to draw]. G. Verschrumfung der Hornhaut. F. L'affaissement de la cornée. Collapse of the cornea.

Sclerotica [σκληρος, hard]. G. Die harte Augenhaut. F. Sclérotique. The firm exterior covering of the posterior and middle portion of the globe.

Scleroticectome, [σκληρος, hard; εκτομη, excision]. G. Die künstliche Pupillbildung durch die harte Haut. F. L'opération de former une pupille artificielle par incision de la sclérotique. Formation of an artificial pupil in the sclerotica.

Sclerotico-choroiditis. G. Entzündung der undurchsichtigen Hornhaut und der Aderhaut. F. Inflammation de la sclerotique et la choroïde. Inflammation of the choroid and sclerotica.

Scotomata. Scotoma [σκοτεω, to darken]. G. Das ansehen der schwarzen Flecken vor den Augen. F. La scotomie. Dark appearances seen in amaurosis.

Scrofulous Ophthalmia. G. Die skrofulöse Augenentzündung. F. Ophtalmie scrofuleuse. Inflammation of the eye in strumous subjects.

Secondary Cataract. G. Nachstaar. F. La cataracte secondaire. Capsular cataract.

Snow-blindness. G. Schneeblindheit. F. Aveuglement de neige. Inflammation of the eyes from the powerful reflection of light from snow.

Staphyloma racemosum [σταφυλη, a grape]. G. Traubenartiges staphylom. F. Staphylome. Prolapsus of the iris through the cornea, so as to cause the front of the eye to resemble a bunch of grapes, or berries.

Stillicidium lacrymarum. G. Thränenträufeln. F. Larmoiement. Dripping of the tears.

Strabismus. G. Schielung. F. Strabisme. Squinting.

S. convergens. G. Convergirende Schielung. F. Strabisme convergente. Squinting inwards.

S. divergens. G. Divergirende Schielung. F. Strabisme divergente. Squinting outwards.

Stye. G. Gerstenkorn. F. Éraillement. An inflammatory tumor on the palpebral margin.

Suppurative ophthalmia. G. Eiternde Augenentzündung. F. Ophtalmie suppurative. Inflammation of the conjunctiva with puriform discharge.

Sycosis [συκη, a fig]. Pustules on the ciliary margin of the lid, with swelling so as to resemble the section of a fig.

Symblepharon [συν, together; βλεφαρον, eyelid]. G. Verwachsung des Augapfels mit den Augenliedern. F. Adhérence des paupières à la prunelle de l'œil. Adhesion of the lids to the globe of the eye.

Synchisis [συγχυω, to confound]. G. Auflösung des Glaskörpers. F. Synchise. Fluidity of the vitreous humor.

Synchisis oculi. G. Auflösung des Augapfels. Softening of the globe.

Synechia anterior [συνηκω, to come together]. G. Verwachsung der Regenbogenhaut mit der Hornhaut. F.

Adhérence de l'iris à la cornée. Obliteration of the anterior chamber from adhesion of the iris to the cornea.

Synechia posterior. G. Verwachsung der Traubenhaut mit der vordern Linsenkapsel. F. Adhérence de l'uvée à la capsule du crystallin. Adhesion of the uvea to the capsule of the lens.

Synizesis pupillæ [συνιζεω, to sit or fall together]. G. Das Zusammensinken der Pupille. F. Rétrécissement de la pupille. Closure of the pupil.

Tarsoraphia [ταρσος, tarsus; ραφη, a seam]. G. Ausschneiden des Augenliederknorpels. F. Excision de la marge du tarse. Excision of the tarsal margins.

Tarsus. G. Knorpel. F. Tarse. The firm elastic cartilage which gives solidity to the eyelids.

Traumatic cataract. G. Traumatischer Staar. F. Cataracte l'effet de blessures. Opacity of the lens produced by injury.

Trichiasis [θριξ, hair]. G. Einstülpung der Augenliederhaare. F. Trichaise. Turning inwards of the cilia upon the eyeball.

Tunica adnata. G. Angewachsene Haut. F. La membrane conjonctive. The conjunctiva.

T. albuginea. G. Lederhaut. F. Tunique albuginée. The sclerotic coat.

T. aranea. G. Kapselhaut. F. La capsule du crystallin. The capsule of the lens.

T. choroidea. G. Aderhaut. F. Tunique choroïde. The choroid membrane.

T. fibrosa. G. Die faserige Haut. F. La tunique fibreuse. The sclerotic coat.

T. Jacobi. G. Jacobische Haut. F. La tunique de Jacob. A thin delicate membrane between the retina and choroid.

T. Ruyschiana. G. Ruyschianische Haut. F. La tunique Ruyschienne. The internal layer of the choroid, seen only in animals.

Tylosis [τυλος, callosity]. G. Schwieligkeit der Augenliederrändern. F. Dureté et épaississement de la marge des paupières. Thickening and induration of the palpebral margin.

Uvea. G. Traubenhaut. F. Uvée. The posterior portion of the iris.

Varicose ophthalmia. G. Aderkropfaugenentzündung. F. Ophtalmie variqueuse. A varicose state of the vessels of the globe.

Varix sacci lacrymalis. G. Aderkropf des Thränensacks. F. Varice du sac lacrymal. Distension without suppuration of the lacrymal sac.

Visus coloratus. G. Das Farbensehen. F. Vue qui réprĕsente les objets sous diverses couleurs. When objects are seen with various colours surrounding them, as in amaurosis.

V. defiguratus. G. Das Ungestaltetsehen. F. La vue tordue. Confused or distorted appearance of objects.

V. dimidiatus. G. Halbsehen. F. Demie vue. When half an object only is seen.

V. duplicatus. G. Das Doppeltsehen. F. Vue double. Two objects seen instead of one.

V. lucidus. G. Lichtsehen. F. Bluettes. Flashes of light seen before the eye in amaurosis.

V. muscarum. G. Mückensehen. F. Mouches volantes. Appearance of flies before the eye.

V. nebulosus. G. Das nebelige Sehen. F. Vue nuageuse. Objects appearing enveloped in a mist.

V. reticulatus. G. Netz-sehen. F. Vue rétiforme. Objects appearing through a network.

Vitia visus. G. Fehler des Gesichtes. F. Defauts de vue. Defects of sight.

Vitreous humor. G. Glassfeuchtigkeit. F. Humeur vitrée. The transparent fluid which occupies the posterior chamber behind the lens and iris.

Xeroma [ξηρος, dry]. A preternatural dryness of the conjunctiva.

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