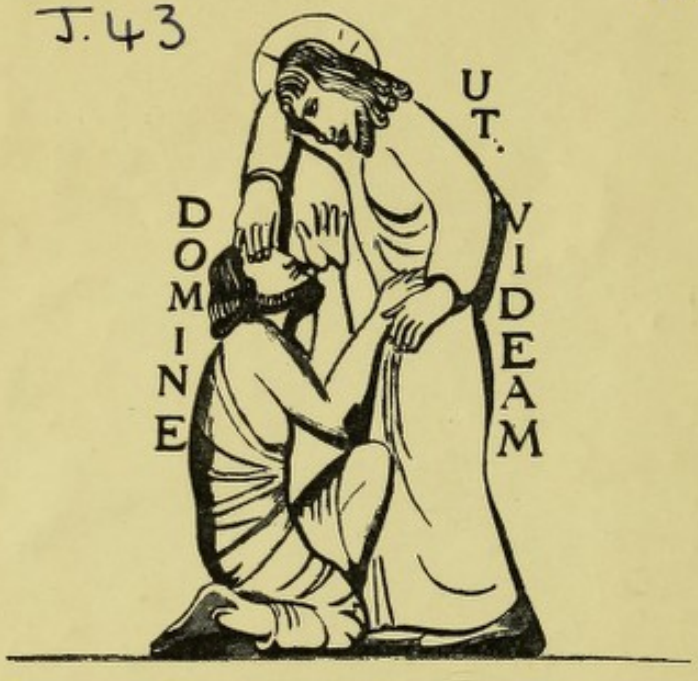
Practical observations on the formation of an artificial pupil, in several deranged states of the eye : to which are annexed remarks on the extraction of soft cataracts, and those of the membraneous kind, through a puncture in the cornea / by Benjamin Gibson.



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IN SEVERAL DERANGED STATES OF THE

EYE;

TO WHICH ARE ANNEXED,

Remarks

ON THE EXTRACTION OF SOFT CATARACTS,

and those of the

MEMBRANEOUS KIND,

THROUGH A PUNCTURE IN THE CORNEA.

ILLUSTRATED BY PLATES.

BY

BENJAMIN GIBSON,

Vice-President of the Literary and Philosophical Society of Manchester, and Surgeon to the Manchester Infirmary.

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1811.

TO

JOHN FERRIAR, M. D.

DEAR SIR,

The high reputation, which you have acquired both as a literary and medical writer, might alone have furnished me with a sufficient inducement to have placed the following pages under the sanction of your name. You have lately, however, added a stronger motive by the kindness and success, with which you exerted your professional skill in my behalf, during a long and dangerous illness. I am happy, therefore, in this opportunity of publicly expressing the esteem and gratitude, with which I am,

Dear Sir,

Your obliged and faithful friend

THE AUTHOR.

Portland-Place, Manchester,
December 28th, 1810.

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THE

PREFACE.

SEVERAL years have now elapsed, since I drew up a few observations on the modes of forming an artificial pupil, adapted to the different states, to which the eye may be reduced by disease. A desire, however, to attain such a degree of experience, as might enable me to speak, with confidence, of the results of different operations, has been the principal inducement to delay, till the present time, the publication of what I deem to be, in a great measure,

novel modes of practice. This opportunity has been afforded me, to an unexpected extent, by the introduction into this country of the contagious ophthalmia from Egypt; the effects of which, in destroying the organization of the eye, I have had occasion to witness in a great variety of forms.

I have attempted to adapt the mode of operating to the several deranged states of the cornea and iris; and with the assistance of Mr. Savigny, have had instruments constructed, to facilitate the formation of an artificial pupil, by means exempt from the degree of difficulty and danger, attending the generality of those operations, which have been proposed by other practitioners. In planning these modes of practice, two objects have been chiefly kept in view; to do little injury to the structure of the eye; and to render the operation as easy, and its result as perfect and certain, as possible. How far I have succeeded, the reader will be able to judge for himself in the subsequent part of the work.

It will not, however, surprize me, if these observations should be received by some practitioners with a distrust, arising from erroneous opinions, which they may have imbibed with respect to the nature of the iris. It is, in fact, generally represented and supposed to be a membrane so irritable, and so delicate in its texture, that even the slightest puncture with the couching needle or cornea-knife, would be attended with serious injury. This, however, I know from experience not to be the case. The Iris appears to me to have less disposition to inflame, than almost any other part of the body. Of this fact sufficient evidence may be gathered from the following pages, as well as from Professor Scarpa's account of his operations.

From the general interest, excited by the distressing effects of the contagious ophthalmia, in all practitioners, who have been in the habit of operating upon the eye, it is extremely probable, that, in their attempts to relieve the sufferers from that

disease, the same methods which I recommend, or others very similar, may have been practised. Under this impression, I have made considerable enquiry amongst my friends in different parts of the kingdom, respecting the modes of operating there adopted; but have not succeeded in acquiring much satisfactory information upon the subject. My worthy colleagues in the Manchester Infirmary, Mr. Hamilton, Mr. Thorpe, Mr. Ransome and Mr. Ainsworth, have performed with success, the operations described in the following pages, in the several cases, which have occurred in their practice. The artificial pupil has also been successfully formed, with the iris-scissars, by my much respected friends Mr. Hey, and Mr. William Hey, of Leeds. To this list, I must add the author of an excellent work "On the Diseases of the Eye," Mr. James Wardrop, who has lately quitted Edinburgh for the Metropolis. Upon the present occasion, I feel particularly obliged to that gentleman, for the very liberal manner, in which he has

communicated to me the modes of operating peculiarly employed by himself, for forming the artificial pupil. Amongst other ingenious expedients, he has accompanied his operations with the application of the Extract of Belladonna to the eye, with much advantage.

That the reader may see, at one view, in what state the operation remained, till within a few years, I have premised a short abstract of the principal modes, which have been employed, at various periods, since the time of Cheselden.

The subsequent part of this essay contains some observations upon the extraction of soft cataracts, and those also, of the membraneous kind, through a puncture in the cornea. I have been induced to adopt the means recommended for these purposes, in preference to employing the couching needle, from observing the very slight degree of injury, which the eye almost uniformly exhibits, after the opera-

tion for forming an artificial pupil, and because the first operation is generally successful.

The cases, which I have related, have been selected from a considerable number, principally because they contain the most striking points, relative to each operation; and to these I have added a few instances, in which the operations have seldom or never succeeded.

To the pencil of my friend Mr. Ransome, I am indebted for the faithful sketches, which accompany this treatise. They were taken, in each instance, after the patient had entirely recovered from the effects of the operation; when the eye had assumed the appearance, which would probably continue through life.

THE

HISTORY OF THE OPERATION,

&c.

SECTION THE FIRST.

THE HISTORY OF THE OPERATION for forming an ARTIFICIAL PUPIL.

THE celebrated * Cheselden appears to have been the first, who made a division of the iris, with the intention of forming an artificial pupil. He introduced a couching needle, which had a cutting edge on one side only, through the sclerotic coat into the eye, at the distance of a line and

* His first operations were performed about the year 1728. See the Philosophical Transactions.

a half from the cornea. Then, perforating the iris on the side next the external angle of the eye, and carrying the point of the needle through the anterior chamber of the aqueous humour, until it reached the side next the nose, he turned the cutting edge backwards, and, retracting the instrument, divided the iris transversely.

Mr. Cheselden's operations appear generally to have been performed upon eyes, in which the iris had closed after the cataract had been couched. Probably from inattention to this fact, his operation was repeated by several oculists with little success; amongst whom were *Sharp, Woolhouse, and some foreign surgeons.

†Baron Wenzel, after having performed Cheselden's operation, relinquished it, because he found, from repeated trials, that the fibres of the iris closed again, after

* Sharp's Operations in Surgery.

† Wenzel's Treatise on the Cataract.

having been divided by a simple incision. In the operation, which the Baron performed, a portion of the iris was removed: his description is as follows.—"The patient "is to be placed in the same position, as "if he were to undergo the operation of "having a cataract extracted, and the cor- "nea-knife, described in the former part "of this treatise, is to be pierced into the "cornea, exactly in the same manner as "in that operation. When the point of "the instrument has arrived at about the "distance of half a line from the centre of "the iris, it must be plunged into this "membrane to about the depth of half a "line: and by a slight motion of the hand "backwards, it must be brought out again, "about the distance of three-fourths of a "line from the part in which it entered.* "Then, pursuing the incision, as it is before "described in common cases of cataract, "the section of the iris will be completed "before the section of the cornea, and

* See Mr. Ware's objections to the Size of this opening. Obs. on the Cataract, &c. 1804.

" will present a small flap, nearly a line in
" diameter. This section of the iris, like
" that of the cornea, will be in the form
" of a semicircle.

" A small pair of scissars is then to be
" introduced under the flap in the cornea,
" and the divided portion of the iris is to
" be cut clean off. By this method an
" artificial pupil will be made, which by
" reason of the sudden and equal contrac-
" tion of the divided fibres, sometimes
" proves to be almost round, and after this
" operation we may rest assured that the
" pupil so formed will never close again.

" It may sometimes happen, in conse-
" quence of the retraction of the fibres of
" the iris, that it will be difficult to per-
" ceive and cut off the divided flap of this
" membrane. With a little attention and
" dexterity, a small portion of it, however,
" may almost always be engaged between
" the points of the scissars, and this portion,
" whatever it be, should be removed."

It was probably in consequence of the difficulty of cutting off the divided flap of the iris, that M. Pelier de Quinsgy advises the mere division of the iris with a bistoury, in a manner similar to that recommended by the Baron, but without removing the flap.

Plenck in his work "De Morbis Oculorum," recommends an operation similar to Baron Wenzel's.

*Janin, a foreign oculist, so far adopted the plan of Baron Wenzel, as to make a large section of the cornea, after which he used scissars to form the opening in the iris. During an operation for extracting a cataract, having accidentally divided, with the scissars, the iris from below upwards, on the side of the pupil next the nose, he conceived that the division of the iris in that direction was the only infallible mode of preventing the lips of the wound from

* Memoires sur l'œil.

coalescing, so as to insure the formation of a permanent artificial pupil. He therefore instituted an operation, as Scarpa informs us, which consists in making an incision as large as that for extracting a cataract, that he might divide with a pair of scissars (from below to above) the iris on the nasal side of the pupil; because a similar operation on the temporal side of the pupil produced a squint.

Professor Scarpa* has published a mode of forming an artificial pupil in those cases, where the natural pupil has become too much contracted or obliterated, after the extraction or depression of a cataract. It consists in separating the outer edge of the iris, for some extent, from its connection with the ciliary ligament. The Professor's operation was suggested by the fact, that the border of the iris may be separated from its connection with the ciliary ligament by less violence, than would be re-

* Traité des Maladies des Yeux.

quired to tear the iris itself. Such a separation he had witnessed from a blow upon the eye, from hernia of the iris, and during the operation of depressing a cataract. "In performing this operation," he observes, "the patient is seated and secured, "as in the operation for extracting a cata- "ract: then with a straight needle, such "as I adopt, the sclerotica is pierced in the "external angle of the eye, about two "lines from the union of that membrane "with the cornea. The point is next ad- "vanced, as far as the upper and internal "part of the border of the iris, on the side "next the nose. In this situation, close "to the ciliary ligament, the needle pier- "ces the upper part of the internal margin "of the iris, until its point is just visible in "the anterior chamber of the aqueous hu- "mour. This step of the operation requires "attention, because this part of the anterior "chamber is very narrow, and if the point "of the instrument advance ever so little "before the iris, it must penetrate the sub- "stance of the cornea. As soon as the

" needle is visible in the anterior chamber,
" it must be pressed upon the iris from above
" downwards, from the internal towards
" the external angle of the eye; as if it
" were intended to carry the instrument
" parallel to the anterior surface of the iris,
" in order that a portion of its border may
" be detached from the ciliary ligament.
" The point of the needle must then be
" depressed, in order to press it upon the
" inferior angle of the rent, which may be
" enlarged at pleasure, by drawing the iris
" toward the temple and directing the in-
" strument from before backwards, in a
" direction parallel to the anterior surface
" of that membrane, and the greater axis
" of the eye.

" Having produced this separation, if
" no opaque body appear in the bottom of
" the eye, the needle may be withdrawn.
" If however any portion of opaque cap-
" sule, which had remained after the de-
" pression or extraction of a cataract, should
" appear near the new pupil, this opaque

" portion being broken down with the point
" of the needle, must be conveyed through
" the artificial pupil and deposited in the
" anterior chamber of the aqueous humour;
" or, as we have before shewn, these mem-
" branous flakes may be left to be gradu-
" ally dissolved and absorbed along with
" the aqueous humour which is incessantly
" replenished."

In a note, affixed to Professor Scarpa's observations on the operation for forming an artificial pupil, he remarks, " It has
" lately been said, that in this particular
" case, (viz. where the capsule of the
" chrystalline lens adhered to the iris, and
" the pupil was obliterated,) the celebrated
" oculist Demours * has fortunately suc-
" ceeded in making an artificial pupil, by
" piercing the cornea and iris with a bis-
" toury near the sclerotic coat, and remov-
" ing a portion of the iris with the scissars
" of the size and figure of a sorrel-seed;

* Recueil Period. de la Soc. de Med. t. VIII.

" and that, without at all displacing the " chrystalline from its natural position."*

Mr. Maunoir, a surgeon of Geneva, in two memoirs upon the organization of the iris and artificial pupils, explains a mode of forming an artificial pupil, founded upon an arrangement of muscular fibres, which he had observed in the iris of man and animals.

" If the iris," says Mr, Maunoir, " be " formed of two concentric muscles, one " external of radiating fibres, and one " internal of circular, one might determine " a priori, the result of different incisions, " which may be made upon that mem- " brane. An incision parallel to the fibres " of one or other of these muscles would " close itself spontaneously. An oblique " incision would leave an opening in the

* I have not been able to procure Mr. Demours' account of his mode of operating, but the reader may see a criticism upon it, in Leveille's French translation of Prof. Scarpa's work, which appears to me to be deficient both in candour and judgement.

" iris, smaller in proportion as the number
" of fibres cut through is less considerable.
" An incision perpendicular to the fibres
" of either muscle will remain open to the
" full extent of its length. This last kind
" of incision made in the dilator muscle,
" will have a form relative to the place in
" which it is made. If it be made in the
" middle of the fibres of this muscle,
" their contraction will be uniform; that
" is to say the two borders or lips of the
" incision will contract equally, and leave
" an opening, as an artificial pupil, of the
" form of a weaver's shuttle: it will resem-
" ble the pupil of a cat."

Upon this structure of the iris, Maunoir founds his operation for forming an artificial pupil, which he describes as follows.

" I begin by making an incision in the
" cornea, as much as possible on the ex-
" ternal side (whether there be an opacity
" at that part or not) about the length of
" six millemeters, (three lines) and at the

" distance of one millemeter from the scle-
" rotica. This incision should have a cur-
" vature parallel to the circumference of
" the cornea, and in general it will not
" differ from that, which should be made
" in the operation for the cataract, except
" that it will be much less. I finish the
" operation with the instrument which I
" shall next describe.

" This instrument is a pair of crooked
" scissars with very thin and narrow blades
" of fifteen* or eighteen millemeters of
" length (seven or eight lines); the bend
" of their border, near the joint, forming
" an angle of about one hundred and forty
" degrees. The superior blade, that is to
" say, that, which should be introduced
" between the cornea and the iris, has its
" extremity formed like a small olive. The

* Fifteen millemeters are as nearly as possible six tenths (or exactly 0.59055) of an English inch.

Eighteen millemeters are about seventy hundredths (or exactly 0.70866) of an English inch, the millemeter being about thirty-nine hundredths of an inch.

" inferior blade, that is to say, that which " is to pass through the iris and be placed " between that membrane and the crystal- " line, ends in a very sharp point and " cutting on its back, for the extent of " about two millemeters.

" The manner of using them is as fol- " lows; the scissars are to be introduced " flat into the incision of the cornea; when " the point is near the part of the iris, " where the incision ought to begin, they " should be turned in such a manner, as " that the flat side may be perpendicular " to the cornea and iris: they are to be " lightly or gently opened and then pushed " sufficiently, so that the inferior blade " may penetrate into the iris the length " which the incision ought to have. Then " the scissars are to be closed neatly, and " the iris will by this means be cut."

These are the different modes of forming an artificial pupil worthy of notice, which have come under my observation. How

far they are any of them worthy of adoption, the comparative success of each would best determine. If such knowledge were attainable, it would form a valuable addition to this abstract.

SECTION THE SECOND.

On the Modes of forming an Artificial Pupil, adapted to different deranged states of the Eye.

THERE are several states, to which the eye may be reduced by disease or accident, which can only be relieved by the formation of an artificial pupil. An opaque state of the cornea, however, is by far the most frequent; and this may be complicated with disorganization and derangement of the internal parts of the eye. When one eye alone is affected with opa-

city in its centre, or the cornea of each eye has become opaque towards the circumference, whilst the centre opposite to the pupil is transparent, vision remains sufficiently distinct, in both instances, for the common purposes of life. It is chiefly in those cases, where the opacity occupies the centre of the cornea, leaving it more or less transparent towards its circumference *only*, that light is prevented from passing through the pupil, and vision so far impaired, as to require the assistance of art. When sight is lost from such a cause, it may be restored in a great measure, by the removal of a portion of the iris, opposite to the transparent part of the cornea, so as to form, what has been termed an artificial pupil.

An operation also for forming an artificial pupil may be necessary, although the cornea be wholly transparent; where the eye has been attacked with inflammation, so as to produce a great diminution or total obliteration of the natural pupil. This state

is generally attended by an opacity of the capsule of the crystalline lens, and by its adhesion to the posterior part of the iris.

The mode of operation for forming an artificial pupil, it is obvious, must be varied according to the circumstances of the case. When there exists merely an opacity in the centre of the cornea, without derangement in the internal parts of the eye; or when the pupil is closed after the extraction or depression of a cataract; in these cases the operation will be the most simple. But if, along with central opacity of the cornea, the iris have formed adhesions to its inner surface, with or without a corresponding diminution of the capacity of the anterior chamber of the aqueous humour, the operation becomes more complex. If again, along with opacity and adhesions of the iris, the crystalline lens or its capsule be opaque, the adoption of still more complex expedients is necessary. The same may be observed of those cases, in which the pupil is totally obliterated or

nearly so, and the iris adheres to the capsule of the crystalline lens; for this rarely happens without an opacity of the lens or its capsule, or of both. Sometimes however, a blow upon the sclerotic coat, particularly affecting the crystalline lens, and probably rupturing the edge of its capsule, is followed by the absorption of the lens, and leaves only the opaque capsule.

In describing the operations, adapted to these cases, it is to be understood, that the subjects of them were generally adults, who had either lost one eye, or had both eyes in similar circumstances of disease. I have never thought it of sufficient consequence to perform the operation, where one eye was entire and perfect.

With respect to the instruments necessary for the performance of these operations, in addition to the cornea-knife, and curved scissars,* one or more of the following†

* The cornea-knife and curved scissars, recommended by Mr. Ware.

† See plate I. fig. 1. 2. 3.

may be requisite according to circumstances.

1st. The very small hook, which is generally found in a case of extracting instruments.

2dly. A small pair of forceps, which shut by a spring, and require the pressure of the finger to open them. Thus constructed, they are not affected by the pressure of the lips of a small incision in the cornea, through which they may be introduced; and when once a fragment is laid hold of, within the eye, the pressure of the spring will retain it between the blades, without the assistance of the fingers. One of the handles of the forceps is of considerable length, and the other short. By this means the forceps can be held steadily between the fingers and thumb, whilst the fore-finger is applied to the shorter handle, to open them occasionally.

3dly. A small pair of iris-scissars, with

one blade blunted at the point. They have handles like the forceps, but differ from them in this respect, that they open by means of a spring. These scissars are sufficiently minute to enter a small incision in the cornea, and to clip off portions of the iris, or of membraneous cataracts.

OPERATION THE FIRST.

Opacity in the Centre of the Cornea.

THE first case, requiring the formation of an artificial pupil, is that, in which a considerable portion of the centre of the cornea has become opaque, whilst a part of its circumference, equal in breadth to about one-third of the diameter of the cornea, remains transparent: this part, however, is so situated, as to admit few of the rays of light to pass to the retina, although the crystalline lens and its capsule be free from disease.

This transparent part, opposite to which it is intended to form an artificial pupil, may be situated at the superior, or inferior part of the cornea, or toward the outer or inner angle of the eye. When the only transparent part of the cornea is situated at the highest point, it is, in general, naturally covered by the edge of the upper eye-lid; which renders the operation in this part less complete, as to the degree of vision restored. The most favourable situation for the transparent part (so far as the facility of the operation is concerned) is towards the outer angle of the eye, or towards the lowest part of the cornea. It is more difficult to operate, when the only transparent portion occupies the inner angle of the eye.

In describing the following operations, I shall select a case, in which the transparent part of the cornea is situated towards the outer angle of the eye. I shall suppose, also, that its extent is one-third of the diameter of the cornea; although an

opacity, leaving a much larger transparent surface, will destroy what may be termed useful vision.

The first step of the operation is to secure the eye-lids, as in the operation for extracting a cataract. A puncture is then to be made in the cornea, with a broad cornea-knife, within a line of the sclerotica, to the extent of about three lines. All pressure is now to be removed from the eye-ball, and the cornea-knife gently withdrawn. The consequence of this is, that a portion of the aqueous humour escapes, and the iris falls into contact with the opening in the cornea, and closes it like a valve. A slight pressure must now be made upon the superior and nasal part of the eye-ball, with the fore and middle finger of the left hand, till at length, by an occasional and gentle increase of the pressure, or by varying its direction, the iris gradually protrudes, so as to present a bag of the size of a large pin's head. This protruded por-

tion must be cut off with a pair of fine curved scissars, and all pressure at the same time removed: the iris will then recede within the eye, and the portion, which has been removed, will leave an artificial pupil more or less circular.

It sometimes happens, that the whole breadth of the iris, to the border of the natural pupil, is protruded and removed in this way. This I consider as rather an advantage, because it ensures a large pupil, though generally one which is oblong in its shape. I have found, however, the mere circumstance of shape to be of little consequence in this operation, and always to be sacrificed to the object of size. It may also be remarked, that the opening has no disposition to close, when, in forming the artificial pupil, the border of the natural pupil is divided.

It occasionally happens, also, that as soon as the knife is removed, the muscles of the eye-ball act with violence, and project a small staphyloma or bag of the iris through

the incision. If this bag be not large enough to form the new pupil, the iris must be further protruded by gentle pressure.

As soon as the operation is finished, the eye is to be lightly covered with a few folds of fine linen, dipped in water, which may be cold in summer, and tepid in winter, and the patient is to be kept in an horizontal position for a few hours. If pain should ensue, an opiate may be taken in the evening, and a saline purge the following morning. These medicines, however, are seldom requisite, but may be used as precautionary.

The principal points to be attended to, in this operation, are, to enter the cornea-knife at a proper distance from the sclerotic coat; not to make the puncture too large; and to snip off the whole of the protruding bag at once, and as soon as can be effected. For immediately when an opening is made in the bag with the scissars, the aqueous humour escapes, the iris retires within the eye, and cannot be again protruded by

the same means, because the expulsion of that membrane depended on its being in an entire state.* If this occurrence should take place, and the artificial opening should not be large enough to form a serviceable pupil, the iris may be again drawn out of the eye, by means of the small hook; or a portion of it, (should it appear more easy) may be removed within the eye, by means of the iris-scissars, as will be explained in speaking of other modes of forming an artificial pupil in more complex cases.

* Having repeatedly observed, with what facility the protruded iris retired within the eye, when the aqueous humour was allowed to escape, from the removal of a portion of that membrane, I have been induced to adopt a similar expedient in recent cases of protrusion or hernia of the iris, arising either from the accidental puncture of the cornea, or happening after the extraction of a cataract. In these cases, I have several times made a small opening in the protruded iris, so as to empty the bag in the former case, and allow the aqueous humour to drain off in the latter. In two cases of protrusion of the iris from accident, after emptying the bag by a small snip with the iris-scissars, it has been returned into its cavity, without difficulty, although the puncture through which it had passed was small. In two cases also of protrusion of the

It occasionally happens, that the puncture in the cornea is made too large, or that too much pressure is applied to the eye-ball during its formation. In either of these cases, a considerable quantity of the aqueous humour may suddenly escape, so as to render the protrusion of the iris improper, on account of the increased degree of pressure which it would require. In such cases, the most judicious plan is to allow the puncture to heal, and to perform the operation at some future period.

From the principles upon which this operation is performed, it is obvious that, all injury to the crystalline lens, or its capsule is avoided; a most material re-

iris, through the incision for extracting a cataract, I have found no great difficulty in returning and retaining the iris in its proper situation, by making a small opening in it, through which the aqueous humour might constantly drain, until the incision in the cornea had closed sufficiently to retain it. No injury to the eye, or to vision, occurred in these cases. It is obvious that this plan can only be adopted with success, when the protrusion has very recently taken place.

quisite to its success. For it is a well known fact, that a cataract cannot be more certainly produced, than by the smallest puncture of the capsule of the lens; a disadvantage, of which some operators have not been aware until too late. It has sometimes happened that, having attempted to form an artificial pupil by Prof. Scarpa's operation, or something like it, with the needle, they have been surprized, in a short time, to observe the crystalline lens, which possessed perfect transparency before the operation, gradually become opaque; unconscious that the cause of this change was, the disturbance given to the lens by tearing up the iris by the roots.

From an operation, in which a considerable part of so delicate a structure as the iris is removed, some degree of inflammation or irritation might be anticipated. When, however, that membrane is divided, without interfering with the other internal parts of the eye, I have never been able to detect in it any disposition to inflame.

If farther confirmation of this fact were necessary, I might adduce the operations of Scarpa, in which the iris is lacerated with the couching needle, and consequently the neighbouring parts a good deal deranged.

With respect to the general result of this mode of operating, my experience has been, that in two or three days, the eye is in a fit state to be exposed to light. The puncture of the cornea seldom produces more than the slightest blush of inflammation, and the *aqueous humour is regenerated in the course of an hour or two. Sometimes when the transparent part of the cornea only forms a narrow slip, a slight cloudiness follows the operation,

* With respect to the time necessary for the reproduction of the aqueous humour, so as to fill the two chambers of the eye, it appears to me that authors in general have considered it much longer than it really is. Maunoir in one of his cases observes, "by taking care to keep the "patient in a dark chamber for two or three days, *one* "*might hope*, at the end of that time, or five or six days "at farthest, he would be cured, that his eyes would bear "the light, and *the aqueous humour be entirely regenerated.*" My attention has been particularly drawn to this point,

which is in general dissipated in a week or ten days. At other times a few drops of blood escape from the divided vessels of the iris, and obstruct the complete success of the operation, until its absorption has taken place. If the effusion of blood from the vessels should exceed this, it generally denotes a morbid state of the iris, which is so far unfavourable, that the artificial pupil has a strong disposition to close. When, along with this state of the iris, the cornea is flatter than natural, and the aqueous humour in consequence scanty, the case is still less auspicious. A morbid state of the iris, seldom, however, attends this simple case of central opacity

both after the extraction of the cataract, the formation of an artificial pupil, and the puncture of the cornea for the extraction of a membraneous cataract; and I have uniformly observed, that the aqueous humour was fully reproduced in the course of an hour or two; provided its escape was not favoured by some uncommon occurrence. A patient of mine, from whose eye I extracted a membraneous cataract, was able, by the assistance of glasses, to read several verses in the New Testament, two or three hours after the operation.

of the cornea. It most frequently occurs, where that membrane has formed adhesions to the internal surface of the cornea; the consequence of a more generally diseased state of the eye-ball.

The permanency of the artificial pupil appears to me to depend, principally, upon the size of the opening, and healthy state of the iris and contiguous parts of the eye, at the time of operation. When the artificial pupil has been made almost as large as the medium size of the natural one, and especially, when the part of the iris removed has included its border, I have never seen any disposition in the opening to close. When, however, a mere narrow slip has been removed; when the iris, from previous inflammation, has become more vascular than natural, or when it is complicated with adhesions to the capsule of the crystalline lens, in such cases its closure has occasionally taken place.

The degree of vision, restored by an ope-

ration of this kind, is not quite so perfect as that, which succeeds the removal of a cataract. In most cases, however, when the cornea has been perfectly transparent to the full extent of one-third of its diameter, the patient has been able to read tolerably small print. In looking at any thing, the direction of the eye and position of the head is somewhat altered, and the object viewed is not held directly before the eye. Thus the artificial pupil, when formed towards the external angle of the eye, is turned by the motion of that organ, more towards the internal angle, so as to bring that side of the eye somewhat forwards, and to produce a squint. And when an object, as a watch, is taken into the hand to be viewed, it is not held, as in the natural state of the eye, directly before the observer; but a little to one side. This alteration in the direction of the eye, and in the situation of the object viewed, is evidently the result of experience; for a person, having an artificial pupil situated towards the external angle of the eye, *can*

discern an object placed directly before him; but he sees it indistinctly, as another person, whose eyes are perfect, discerns objects inaccurately which are placed aside whilst the eye is directed to objects before him. The reason of this appears to be, that the rays of light passing from oblique objects, or entering the eye with great obliquity, do not reach the retina in sufficient quantity to render vision distinct. This indistinctness the patient attempts to remove, by placing the object in different situations, and by varying, at the same time, the position of the eye and head, until he at length discovers the exact position of the eye and object, most conducive to distinct vision.

I have paid considerable attention to the state of the artificial pupil, after the eye has quite recovered, in order to ascertain, whether the fibres of the iris possess any power of motion, so as to alter the size of the new opening; but have never been able to detect any thing similar to the con-

traction and dilatation of the natural pupil. It appears to me, that, although the new pupil may sometimes close, when the iris is in a morbid state, yet that this membrane, a few days after an operation, has very little disposition to contract, in whatever situation the artificial pupil may have been made.

My reason for forming the artificial pupil towards the external angle of the eye, when circumstances allow it, is, that instruments can be used in this part with more facility, than in any other part of the cornea; and every advantage is, at the same time, derived from the operation. When this part of the eye has been found opaque, I have formed the pupil, in several cases, both at the inferior part of the cornea, and towards the internal angle of the eye. I did not however observe, that my patients saw at all more distinctly. On the contrary, when the artificial pupil was formed towards the internal angle of the eye, the sight in my opinion was less extensive; the nose appearing in some measure to curtail the field of vision. I

prefer therefore the operation at the external angle, in all convenient cases; and if the patients are enabled to read with more certainty by this mode, than any other, they can have little reason to be dissatisfied with the slight squint of which it may be productive.

When both eyes have happened to be similarly affected with opacity of the cornea, I have found it of little use to the patient, to form an artificial pupil in each. For when the vision of one eye, after the operation, is more perfect than that of the other, the patient (as in many cases of defective vision) acquires the habit of using the more perfect eye, and entirely neglects the other. When, therefore, I meet with a defect in both eyes from opacity, I select the more perfect for the subject of an operation.

CASE THE FIRST.

HENRY King,* whilst upon garrison duty at Gibraltar, was attacked with great violence by the Egyptian Ophthalmia. The sight of the right eye was thereby entirely destroyed, and the cornea of the left eye was rendered opaque in its centre, to the extent of one-third of its diameter. The part of the cornea, which remained transparent, was favourable for the formation of an artificial pupil towards the external angle of the eye; and the iris appeared to be free from adhesions to the surrounding parts.

* See plate II. fig. 1.

The operation, in this case, was such as has already been described. A puncture was made in the cornea with the knife, to the extent of about three lines. All pressure was immediately avoided, and the knife withdrawn. When the eye had remained tranquil for a few seconds, the eyelids were separated, and gentle pressure was applied both to the superior and inferior part of the eye-ball, next the internal angle. By this mean, a bag of the iris, filled with the aqueous humour, was protruded through the puncture in the cornea. The pressure was steadily continued, until the bag was cut off close to the cornea, with a pair of fine curved scissars. The iris immediately receded into the eye, and although the cornea was flaccid from the escape of aqueous humour, the patient expressed his satisfaction at the strong light admitted by the new pupil. When the eye had recovered its plumpness, from the regeneration of the aqueous humour, the artificial pupil appeared of an oblong square shape. No inflammation ensued, and the patient left the hospital able to read common print.

OPERATION THE SECOND.

Central opacity of the Cornea, attended with adhesions between the Cornea and Iris, which include only a portion of the inner border of the Iris.

THE next case, to which the mode of operating in forming an artificial pupil may be adapted, differs from the former in being attended with adhesions of the iris to a part of the opaque inner surface of the cornea. The situation and extent of such adhesions is various. In one case, only two or three small points of adhesion may take place. In another, the iris may adhere

by a considerable surface. Sometimes one-half of the border of the pupil is involved; but that part of the border is generally free from adhesion, which is situated towards the transparent part of the cornea. This part, I shall suppose, as in the last operation, to occupy the external angle of the eye.

The consequence of considerable adhesions, existing between the iris and cornea, is, that the iris frequently cannot be protruded through an opening in the cornea to a sufficient extent to form, by its removal, an efficient artificial pupil, as in the operation already described. The attempt, however, may always be made, and the protruded part be cut off, however small it may be. If this expedient should not succeed, the next step must be to introduce the small hook through the part of the pupil, which does not adhere to the cornea, and to lay hold of the border of the iris. With a little care this membrane may generally be drawn out of the puncture in the cornea,

and cut off with the curved scissars. In doing this, all laceration must be avoided.

It seldom happens, when any considerable part of the border of the pupil remains free from adhesion, but that a sufficient portion of the iris may, by the first attempt, be drawn out, so as to form a sufficiently large artificial pupil. Should this not be accomplished, it may usually be effected by a second introduction of the hook. Much however, in such cases, must be left to the discretion and judgement of the operator. If, for instance, he should not observe any part of the iris, which can advantageously be drawn out with the hook, after making one attempt with that instrument, he will probably employ the iris-scissars, and enlarge the opening within the eye: or having clipped a portion of the iris, which now only adheres by a slight film, he will think the forceps the best means of removing it. Sometimes a slight point of adhesion between the iris and cornea may be advantageously separated by the cornea-knife, at the time of making the puncture:

or the iris-scissars may be employed for the same purpose, previous to using the hook. In short, as no two cases are alike, the operator must take advantage of particular incidents, and use this or that instrument as seems best suited to circumstances.

My reason for recommending the operator to cut off any small part of the iris, which may be protruded by the attempt made for that purpose, at the commencement of the operation, is this; that its removal may form a convenient opening, through which one blade of the iris-scissars may be introduced, if it should be found impracticable to draw out the iris with the hook, on account of existing adhesions. In such a case, the artificial pupil must be formed within the eye, by the iris-scissars; which are to be used in the manner explained in the third operation.

CASE THE SECOND.

CAPTAIN F.* was one of the many sufferers from loss of sight, whilst upon service in Egypt. He was attacked by the ophthalmia, prevalent in that country, and had the right eye entirely destroyed by its ravages. When he applied to me, he had been for some years deprived of all useful vision. The cornea of the left eye was occupied by an opacity in its centre, to the extent of one-third of its diameter, from which a considerable cloudiness spread

* See plate II. fig. 2.

over the transparent portion, towards the inner angle of the eye, and encroached in a smaller degree upon other parts. The greatest extent of transparency was situated somewhat below that part of the cornea, which is opposite to the external angle of the eye. Here it appeared perfectly healthy, and had not been attacked by any inflammation or muddiness, for many months; although, previously to that period, it had been rather liable to become inflamed.

With respect to the state of the iris, its inner border, where it forms the pupil, had contracted adhesions with the opaque internal surface of the cornea, towards the nose. These adhesions did not comprehend one-half of the inner border of the iris, but were so firm, and so situated, that they dragged the whole pupil more towards the internal angle of the eye, than is natural. The cornea, however, was plump, and the aqueous humour in good quantity. The remainder of the rim of the iris, which

had formed no adhesions, was alternately contracted and relaxed on the admission or exclusion of light, and afforded an oblique but somewhat obscure view of the crystalline lens, which appeared transparent.

Under these circumstances, I had little expectation of protruding a sufficient portion of the iris, by pressure, and therefore purposed to use the small hook,* taking advantage at the same time of any portion of the iris, which might be capable of being gently protruded.

The incision of the cornea, in this case, was made of the usual size, so as to correspond with the situation of the most extensively transparent part of that membrane. A degree of pressure was then made, in the manner already described, but only a small bag of the iris could be protruded, which was cut off with the curved scissars. The hook was next introduced flat, and with its point downwards, until it laid hold of the inner

* Vide, plate.

rim of the iris, which was gently drawn out in sufficient quantity, to be cut off by the curved scissars. The new aperture, thus formed in the iris, was irregular in shape, but formed an excellent artificial pupil.

An opiate was given at night, by way of precaution, and a saline purgative the morning after the operation. Neither the cornea, however, nor the iris exhibited any appearance of inflammation; and my patient very soon left Manchester, able to read with the help of glasses.

I have operated somewhat differently, upon five cases, similar to this, with equal success. In three of these, the iris adhered to the superior part of the cornea, by a small point, situated at some distance from its rim. This slight adhesion I separated, with the point of the cornea-knife, when the incision of the cornea was made, that the iris might

be rendered as loose as possible previously to the introduction of the hook. In two cases, the iris was incapable of being drawn out by the hook, although the adhesion of its inner rim did not appear extensive. In these cases, the iris-scissars were used within the eye, with perfect success.

OPERATION THE THIRD.

Central Opacity of the Cornea, attended with extensive Adhesions to the Iris, which include its whole Border, or nearly so.

IN the present case, the adhesions between the iris and cornea are much more general and extensive than in the last, the whole border or circle of the pupil being enveloped by them. This state requires some change in the mode of operation. Before the hook or iris-scissars can be used with advantage, it becomes necessary to separate the adhesions as extensively as

possible. In this case it generally and very fortunately happens, that the iris is drawn forwards by the natural internal concavity of the cornea, to which it adheres, so as to be put upon the stretch, and is thus, separated to some distance, from the anterior surface of the crystalline lens. Of these circumstances advantage must be taken by the operator.

The point of the cornea-knife is to be passed through the cornea in the usual way, and is to be directed to those adhesions, the division of which will most effectually tend to render the iris free, for the subsequent part of the operation. Care must, at the same time, be taken to avoid undue pressure upon the eye-ball, that the aqueous humour may not escape, before that object is accomplished; for otherwise the cornea, and the adhering iris will become flaccid, and the adhesions be much more difficult to separate.

Having separated some part of the iris from its connection with the cornea, and

consequently made an aperture in it, the next step will be to remove a portion of it, in a convenient situation. If the iris appear sufficiently loose, the hook may be first introduced through the puncture in the cornea, and a gentle attempt be made to draw out a sufficient portion from the eye, to be cut off with the curved scissars. If this be found impracticable, the iris must be removed, within the eye, by means of the iris-scissars.

In using these small scissars, they are to be introduced shut and flat, through the aperture in the cornea; and at the place where the artificial pupil is to commence, a small opening is to be made with them, in the iris. Through this opening, the blade of the scissars, which is attached to the long handle and has a blunt point,* is to be conducted between the iris and crystalline

* When an opening has been formed in the iris, previous to the introduction of the iris-scissars, it will be adviseable to use a pair blunted at both points.

lens, by opening the scissars a little. The other blade is to be passed between the inner surface of the cornea and the iris, until their points reach a little beyond the border of the iris, where it has been separated from its adhesions. This portion of the iris is then to be divided, and the flap thus formed may generally be easily removed by another snip or two with the scissars. By this means an artificial pupil of a triangular or oblong shape will be made, which may easily be enlarged by the use of the scissars, if it should appear too small.

To the permanent success of this operation, I always consider it of consequence that a portion of the iris should be removed. For although the mere division of the iris appears to afford a sufficient aperture during the operation, yet this is only temporary, since it arises from the aqueous humour having been evacuated, by which the lens and vitreous humour lose their support anteriorly, and are pressed forwards so as to distend the new opening. Hence it hap-

pens that the edges of the iris frequently return to their former situation, when the eye-ball has become plump; especially if the border of the iris has not been divided. The only case, in which I now depend upon a simple division of the iris, is, where this membrane, after the operation for extracting a cataract, has formed a large staphyloma, and has, in consequence, been enveloped by the incision of the cornea to such a degree, that during the healing process, the uppermost part of the pupil is at length dragged down to the lowest part of the cornea. By this means all useful vision is destroyed, and the iris is put upon the stretch. When, in such a case, an horizontal incision is made in the iris, the aperture will remain permanent, because its fibres had previously received all the extension of which they were susceptible.

It occasionally happens in this operation, that particular circumstances may induce the surgeon to postpone its completion.

If, for example, an attempt to draw out the iris with the hook should prove ineffectual, and the division of the adhesions with the iris-scissars should appear in the least likely to injure the lens or its capsule, in consequence of the aqueous humour having escaped; the best plan will be to postpone the operation, until the eye has recovered from the effects of the puncture. The cornea will then be plump, and the adhesions of the iris may be divided more completely by the cornea-knife, so that the operation may be safely completed with the iris-scissars.

In cases of this kind, the iris is sometimes more vascular than usual, and the effused blood so much obscures the parts to be divided, that the operator cannot act with any certainty. This state of the iris, therefore, furnishes another reason for postponing the completion of the operation, until the absorption of the effused blood has taken place. All attempts, however, in such cases, sometimes prove ineffectual.

CASE THE THIRD.

JAMES Dutton, a private soldier, lost his sight in Egypt from the contagious ophthalmia. When he applied to me the right eye was entirely sunk, and the inner rim of the iris of the left eye adhered so extensively to the cornea, that no aperture could be discerned in the pupil.

One general effect of a violent attack of the Egyptian ophthalmia, particularly when the internal parts of the eye suffer much from the inflammation, is, the suppression of the natural secretion of the aqueous humour. The consequence of this is, that,

when the quantity, which the eye contained at that time, is removed, (most probably by absorption) the cornea and iris fall into contact, and their surfaces, being in a state of inflammation, become more or less closely united by adhesive inflammation. This process, it would appear, takes place whilst the secretion of the aqueous humour is suspended: and when this humour is formed again, so as to distend the cornea, the iris, (as has happened in many cases of the kind which have come under my inspection,) is drawn forwards, in consequence of its connection with the internal surface of the cornea. Hence also the iris becomes convex anteriorly, whilst its posterior surface is separated, for some distance, from the crystalline lens, and the whole membrane is put more or less upon the stretch. This was the exact state of the iris in the present case.

With respect to the cornea, an opacity occupied its surface, so as to leave a transparent portion towards the external angle

of the eye, of somewhat greater extent than one-third the diameter of the cornea. Excepting this transparent part, which gradually terminated in an obtuse point towards the superior and inferior portion of the cornea, the rest of this membrane was entirely opaque. The patient could merely perceive the shadows of persons passing between him and a window, and discern a strong from a weak light.

In operating upon this patient, I was fortunate enough to separate the adhesions, formed between the iris and opaque cornea, with the cornea-knife, to such an extent as to allow the iris to be drawn out, through the puncture, without difficulty, and a sufficient portion to be cut off with the curved scissars. The pupil approached more to the natural form, than might have been expected in such a case.

The result of this operation was quite satisfactory. I find, from my notes, that the patient took an opiate at night, and a

saline purge next morning; so that more uneasiness than usual, probably took place. He could see, however, an object such as a watch on the third day, and left the hospital able to read.

Although the iris was drawn out with the most perfect ease in this and two or three similar cases, yet in the majority of instances, I have been unable to effect this, and have, in consequence, used the iris-scissars.

OPERATION THE FOURTH.

Central Opacity of the Cornea, and total Opacity of the Crystalline Lens, or its Capsule; with or without Adhesions of the Iris to the Cornea.

THE next case, in which an artificial pupil is necessary, consists in an opacity of the lens or its capsule, in addition to a central opacity of the cornea. It may be attended with adhesions between the cornea and iris, or it may be entirely free from them. This state of the eye, requiring the removal

of the crystalline lens and its capsule, renders a more complex mode of operating necessary, but is by no means so frequent as that, in which the lens remains sound.

I cannot better describe the steps necessary in such operations, than by relating the case of Mr. Rushton, of Liverpool. This gentleman, when in his eighteenth year, was attacked in the West Indies, by a violent ophthalmia, which entirely destroyed one eye. When he consulted me in the year 1805, (thirty-one years afterwards) I found the cornea of the left eye affected by a central opacity, occupying more than one-third of its surface. The greatest extent of transparency was situated towards the outer angle of the eye, and the border of the pupil could be faintly observed by looking obliquely under the opacity. My patient possessed sufficient perception of light, to prove that the retina and optic nerve were sound, although the state of the crystalline lens remained uncertain. The cornea was much flatter than

natural, and the aqueous humour in small quantity.

In my first operation, I attempted to form an artificial pupil, by protruding the iris through an incision of the cornea. Adhesions, however, towards the inner angle of the eye, prevented me from protruding a sufficient portion, so that I was only able to cut off a bag of the size of a small pin's head.* It became necessary, therefore, to remove a further portion within the eye, by means of the iris-scissars; the opening already made in the iris allowing a blunt pointed blade to pass through it. The artificial pupil, when completed, was of an oblong square form and sufficiently large. The inflammation, which succeeded, was trivial, and a slight muddiness, which sometimes affects the transparent part of the cornea after an

* I had not at this time begun to use the hook, otherwise I should have attempted to have drawn out the iris in this case, previously to employing the iris-scissars, although the experiment would have been ineffectual.

operation of this kind, was dissipated by the fifth day.

Thus far I had operated on the presumption, that the lens and its capsule were in a sound state; but I now discovered that one or both of them were opaque, and that without their removal the artificial pupil would be of little benefit, though vision was in some degree improved.

The extraction of a cataract, under such circumstances, (although it has been recommended) appeared to me too hazardous an experiment. I therefore determined to depress the cataract, if possible, or to break down its substance and capsule, if it should be found too soft for depression. The latter happened to be the case, I therefore passed Mr. Hey's couching needle freely through the substance of the lens and its capsule, and pushed a part of it through the artificial pupil into the anterior chamber of the aqueous humour. Small fragments of the lens continued to pass for

a fortnight, and then ceased. Some days afterwards, the lens put on a flocculent appearance, and I had then an opportunity of evacuating a considerable portion of it through a small opening in the cornea, by means of the curette. For the quantity of aqueous humour in both chambers of the eye, was so small, that the removal of the whole substance of the lens by solution would have been uncertain, or, at any rate, extremely tedious. After waiting until the eye had recovered from the effects of the puncture, I repeated it, and evacuated more of the lens. I now wished to spare the eye the repetition of the operation, and had every reason to hope, that in a few months, the remaining part of the lens would be removed by the agency of the aqueous humour. My patient therefore returned home.

When I saw him again in the spring of 1807, I found the pupil still occupied by a plug of opaque matter, which appeared to have a solid texture. In consequence

of the repeated incisions, a slight degree of opacity, had encroached upon the edges of the transparent part of the cornea. The couching needle of Professor Scarpa now appeared to me best adapted to remove the opaque substance; and this object, by a few slight rotatory motions, the instrument completely effected; for the whole mass was solid, and had only a slight attachment to the border of the artificial pupil.

In this case, there were more difficulties than usual. The transparency of the cornea was of small extent; the quantity of the aqueous humour was scanty; the cornea in consequence was flat, and the chambers of the aqueous humour small. The iris was prevented, by adhesions, from protruding sufficiently. The crystalline lens was opaque and too soft for depression. Still, the event was as fortunate as could have been expected. For although, in the present state of his eye, objects appear to Mr. Rushton as if covered with a thin mist, yet he can see to read many pages

at a time by the help of glasses, and has the great satisfaction of beholding his wife and family.

In this case, though a small part of the inner border of the iris was free from adhesions, yet the state of the lens or its capsule could not be ascertained by inspection. In other cases, where the whole of its border is enveloped, there is still less opportunity of becoming acquainted with this fact. In forming, therefore, the artificial pupil, in such cases, we must proceed upon the presumption that these parts are sound, and avoid every movement that might tend to injure them. When the pupil is formed, their state becomes obvious, and if they should prove opaque, their removal must be attempted, but not till the eye is perfectly recovered from the previous operation.

If, however, in so complicated a derangement of the structure of the eye, the opacity of the lens or its capsule should be

ascertained by any means, the most judicious plan would be to depress it, previously to forming the artificial pupil. If too soft for depression, the lens should be freely broken down, so that a considerable part of it might be removed in a pulpy state, through the artificial pupil, when formed. The removal of the lens, before the formation of the pupil, is to be preferred, because during couching, any adhesions may generally be discovered which may exist between the capsule of the lens and the iris, and which sometimes occasion difficulty and embarrassment during the operation.

OPERATION THE FIFTH.

Total Closure, or Obliteration of the Pupil, attended with entire Transparency of the Cornea.

ANOTHER case, requiring the formation of an artificial pupil, differs from all those, which have been described in the foregoing pages, in this respect; that the cornea is free from any opacity, which might affect vision. This case consists in a total closure or obliteration of the natural pupil, produced commonly by inflammation of the iris and internal parts of the eye. It

occasionally occurs, also, after couching or extracting a cataract, or from blows, or other injuries. The principal varieties, which occur in this case, are produced by the presence or absence of the crystalline lens; or by adhesions formed between the capsule of the lens, and postérior surface of the iris, which are almost invariably discovered to exist.

When it is certain that the lens has not been removed, I would recommend the use of the couching needle to depress it, or break down its substance; because the edges of the newly made pupil sometimes contract adhesions with the capsule of the lens, by which its aperture is considerably diminished; and because the presence of the lens, especially as its capsule generally adheres to the posterior surface of the iris, sometimes produces embarrassment during the operation, or at least may render it more difficult. By a little caution, any injury to the iris may be avoided, although the exact part, to which the couching needle is directed, cannot be seen.

When the lens has been depressed or broken down, the operation, in all cases of closed iris, is nearly the same. The artificial pupil is to be formed in the centre of the eye, and its extent must be nearly one-third the diameter of the iris. The point of the cornea-knife, after entering the anterior chamber of the eye, must be directed to that part of the iris, which is distant about one-third of its diameter from the external angle. This is to limit the artificial pupil towards the outer part of the eye. Here it is to be passed through the iris, so as to make an opening equal in extent to about one-third the diameter of that membrane. If it be found practicable, a smaller incision may be made opposite to this, by repassing the point of the knife through the iris, where the pupil is intended to terminate, at a corresponding distance from the inner angle. A flap may then, by a gentle motion of the cornea-knife downwards, be sometimes formed, and may be removed by the introduction of the iris-

scissars. Generally, however, only the simple incision of the iris, without a flap, will be accomplished. Under such circumstances one blade of the iris-scissars must be advanced through the incision in the iris, and the other between the cornea and iris, until they include about one-third of its diameter. The iris must next be divided, from the upper extremity of the incision, a little obliquely downwards, in such a way, that when the scissars are applied in a similar direction from the lower extremity of the incision in the iris, the new pupil may approach in figure to an equilateral triangle.

If the crystalline lens has been previously broken down, a part of it generally escapes through the new pupil in a soft state. Its removal must be further effected by the curette; and if the artificial pupil be sufficiently large, and the aqueous humour plentiful, it will seldom be necessary, for the extraction of the lens, to puncture the cornea a second time.

In this case, when both eyes happen to be similarly circumstanced, with respect to disease, the patient will derive benefit from the formation of a pupil in each eye. With a little care, the operator may form the two nearly alike: at any rate, the surgeon must not attempt to make any improvement in the shape or size of the second, because the first was not quite so good as might have been wished. As the main object is to make both pupils correspond, with respect to vision, the first, if not very objectionable, must be taken as the model for the second.

CASE THE FIFTH.

WILLIAM Crooke* applied at the Manchester Infirmary, in May 1804, on account of blindness, which had existed for several years. On inspection, the pupil of each eye was found entirely closed, so that the state of the crystalline lens, or its capsule, could not be discerned in either. As, however, his loss of vision was occasioned by violent internal inflammation of the eyes, it was concluded that adhesions had formed between the opaque capsule of the lens and the posterior surface of the iris, and that the crystalline lens was most

* See plate II. fig. 3.

probably in an opaque state; as had uniformly been observed in a variety of similar cases.

The operation, in this case, consisted of two stages. In the first, the substance of the crystalline lens was broken down in each eye. In both instances, it was soft, and readily yielded to the pressure of Mr. Hey's couching needle. The right eye was irritated, and some inflammation followed, which required the use of leeches, purgatives, and cooling collyria.

The second part of the operation was performed in about a fortnight, when the eyes had perfectly recovered, from the inflammation produced by the couching needle. It consisted in entering the knife through the cornea, into the anterior chamber of the aqueous humour, at the usual part. The point of the instrument was next passed through the iris, at the distance of about one-third of its diameter from its root, so as to form an open-

ing, whose length was also about one-third the diameter of the iris, as nearly as could be calculated. The cornea-knife was then gently withdrawn, and the iris-scissars were introduced shut, until they reached the new formed opening in the iris. They were then opened, and one blade was passed through the aperture formed in the iris, and the other blade directed anterior to that membrane, until the middle third of the iris was included between them. An incision was now carried through the included portion, commencing at the upper part of the opening made by the cornea-knife, and directed a little obliquely downwards; so that when a similar incision was made from the inferior part of the same opening, the pupil formed an irregular aperture, resembling in some degree an equilateral triangle.

As soon as this portion of the iris was cut out, the opaque fragments of the crystalline lens presented themselves, in a pulpy state, and were removed through the new

pupil by means of the curette, until an inconsiderable portion only remained. The aqueous humour being in great plenty, the remaining fragments of the lens disappeared in the course of a week, and no further operation was necessary upon this eye.

The right eye, which was not operated upon with the iris-scissars, until the left eye had recovered, required the scissars to be used twice, with some interval; principally because the new formed pupil had contracted into too small bounds, and was not, therefore, similar to the pupil of the left eye. The opaque fragments of the lens, also, had not a sufficiently free egress from behind, into the anterior chamber of the aqueous humour. By a second operation with the iris-scissars, the pupil was enlarged, and the whole of the opaque fragments were removed by the curette. Some degree of inflammation again attacked this eye; which, however, is a rare occurrence after this operation. This patient returned

home, and was able to follow his occupation as a weaver.

The foregoing cases, which I have selected, as containing the most striking circumstances, explanatory of each operation, may appear partial to the reader, because they are all stated to have been successful. Such, however, has been almost uniformly the result of every operation of this kind, where the previous state of the eye afforded much expectation of success. There occur, it is true, several deranged states of that organ, in which I have operated, without much ground of hope, and which have been little, if at all relieved. In these instances, I have frequently employed the modes described, either at the earnest request of a patient, or because I wished to be able to discriminate with accuracy between those cases, in which the several modes of operating could be employed with advantage, and those, in which all attempts would prove abortive. And as it

will be satisfactory to every surgeon to know what cases to avoid, as subjects of operation, I shall here subjoin three or four instances of this kind; comprehending the general result of my experience.

The first morbid state of the eye, in which I have never met with success, after repeated trials, is attended with a great degree of contraction of the pupil, which is occupied by the opaque capsule of the crystalline lens, adhering strongly to the inner border and posterior surface of the iris. The aqueous humour is generally deficient in quantity, sometimes entirely wanting. In consequence of this deficiency, the iris projects more or less forwards, and frequently touches the cornea. The iris also generally undergoes some change in colour: it becomes either wholly or partially of a dove-colour, or a dusky blue. In most instances, it is thrown into irregular projections, one part bulging out, and the intermediate space being apparently drawn backwards. When punc-

tured or cut, it generally bleeds considerably. The crystalline lens, as far as my observation goes, is almost always opaque, and the cornea frequently more prominent than usual, sometimes speckled with minute points of opacity.

With respect to the state of vision, it is always unpromising. The patient can seldom distinguish the light of a dull day from total darkness. The sun, a bright fire, or a candle affording only a slight perception of light.

In many cases of this kind, I have removed the crystalline lens, and formed an artificial pupil, but without the smallest success. The retina appeared to be equally insensible to the impression of light, when all impediments were removed, as before the operation was performed.

Some cases, of this kind, could be clearly traced to a venereal taint: in others, however, which very nearly resembled the

former, the derangement of the eye appeared to have arisen spontaneously.

The state of vision, in the next case which I shall describe, is generally more favourable. The patient can discern, occasionally, the shape of the hand, the number of fingers held between him and a window, or the glittering of a metal watch. The cornea, although perfectly transparent in the centre, is traversed towards its circumference by many small deep-seated vessels, carrying red blood. It is generally flatter than usual, and bears the marks of previous inflammation. The aqueous humour is deficient in quantity, yet the iris retains its usual form and is not pressed unnaturally forwards. The size of the pupil is sometimes very much diminished.

The capsule of the crystalline lens is always opaque, and adheres to the inner rim and to the posterior surface of the iris. On the white surface of the capsule, small red vessels may generally be observed,

shooting into the substance of the iris. In short, the cornea, the iris, and the diseased capsule, all shew evident marks of morbid vascularity.

So unfavourable a state of these important parts, generally frustrates all attempts to form an artificial pupil. Hence it will generally be found, that, after using the preparatory means for dislodging or breaking down the crystalline lens, the first puncture of the iris produces a flow of blood, which soon fills the anterior chamber of the aqueous humour, and conceals the iris from view. To remove this effused blood, by means of the curette, is generally insufficient, and the operation must necessarily be relinquished for the time. But it unfortunately happens, that in a second or third attempt the same obstacle generally presents itself. In addition to this, the diseased state of the cornea, (which generally consists in chronic vascularity, rather internally than externally seated) renders it obnoxious to inflammation,

which gradually gives rise to adhesions between the cornea and iris, commencing at the circumference of those membranes, and spreading by degrees towards their centre. By this morbid process, the anterior chamber of the aqueous humour is encroached upon, until it is, at length, entirely obliterated. The opening, formed by the cornea-knife in the iris, invariably closes again; and, if a successful effort with the iris-scissars, under circumstances so disadvantageous, should have removed a portion of the iris, its diseased state generally occasions the closure of the new opening.

This case is, perhaps, one of the most vexatious, which an operator can meet with, who is unacquainted with the actual state of the parts concerned. The transparency of the cornea, the appearance of the iris, and particularly the degree of vision, will lead him to form a prognosis, much too favourable: for, in the end, he will generally have the mortification to

leave his patients much more defective in sight than he found them.

Another variety of diseased eye, in which I have operated with little success, is of much more frequent occurrence, than the two cases already described. It consists in an opacity of a very considerable portion of the centre of the cornea, leaving not more than one quarter of its diameter transparent, in any part of the circumference of that membrane, in some parts much less. Besides this obstruction to vision, the crystalline lens and its capsule are generally opaque. In a case of this kind, the cause of failure arises from the cornea being much predisposed to become opaque, from previous disease, the consequence of which almost invariably is, that the transparent part of the cornea, contiguous to the puncture formed for the introduction of the hook or iris-scissars, also becomes unfit for transmitting light to the retina. In such a case, I have made repeated punctures, and removed several successive portions

of the iris, but from the cause I have mentioned, have generally been disappointed in my expectations. I still, however, always make the attempt, when the patient is desirous of trying the event of the operation, although it offers but little prospect of success.

In this case, the iris is frequently more thick and vascular than usual, which adds a further impediment to a favourable result. So untoward a state of the cornea and iris, in which an incision in the former generally induces opacity, and an opening in the latter has a strong disposition to close, furnishes, in my opinion, the only apology, which an operator of any steadiness can produce, for performing so rude and ill-devised an operation, as that proposed by Professor Scarpa, which consists in tearing the iris from its attachment to the ciliary processes.

The last case, which I shall mention, may be described in very few words. The

cornea, from previous inflammation, in instances of this kind, has become entirely opaque throughout its whole extent, except an inconsiderable portion at its circumference, not exceeding, in length or breadth, one quarter the diameter of the cornea, which remains tolerably transparent. The opaque portion is generally thicker than common, and irregular upon its surface. In such a case, which is no uncommon effect of the Egyptian ophthalmia, I have operated several times at the patient's request, and, in one or two instances, with as much success as could be expected; but, in the majority of cases, the means adopted induced a degree of inflammation, which the diseased structure of the cornea could not withstand. The loss of a scanty perception of light in these and similar instances, is always very much regretted by the patient, however anxious he might have been for the operation, or however plainly its dangers might previously have been explained to him.

The five operations, already described, are the only expedients which I have found necessary, in the various deranged states of the eye-ball, that have fallen under my inspection, in order to form an artificial pupil, and to remove concomitant impediments to vision. Practitioners will, no doubt, meet with cases differing from any of these, and requiring different plans of operating. In the mean time, these remarks may serve to fill a chasm in British Surgery, and may facilitate that progressive improvement, by which complicated operations are slowly brought to their final perfection.

SECTION THE THIRD.

On the Mode of extracting a soft Cataract, through a Puncture in the Cornea.

ALTHOUGH in those cases, where the extraction of a cataract can be performed with facility, I greatly prefer that operation; yet under certain circumstances, such as the eye being much sunk, the cornea being flatter than usual, the patient young,*

* In infants, the couching needle, or an instrument resembling it, can alone be employed with safety to the eye: and, according to my experience, it is more certain to remove the disease in these young subjects, than in

or when there exists any other considerable impediment to the free use of the cornea-knife, I think the couching needle may be employed with more prospect of ultimate success. But it occasionally becomes necessary to repeat the operation of couching several times in the soft cataract. For though all possible care has been taken to rupture the anterior part of the capsule of the lens with the needle, so as to admit freely the aqueous humour, yet the disappearance of the cataract is occasionally very slow; the patient becomes anxious; his health impaired; and the eye itself

adults, and quite as easy in its application. The cataract, in these cases, is sometimes membraneous; but more generally it is milky or pulpy in its consistence, and its capsule, at this early age, is tender and easily broken down by Mr. Hey's or Professor Scarpa's needle. After this operation, the complete removal of the substance of the cataract, by means of the aqueous humour, has uniformly taken place in the several cases, which have come under my care. The age of the patient has never appeared to me any objection to the use of the couching needle, and I have been in the habit of operating, for ten years, upon subjects of all ages; although I prefer an infant, from half a year, to a year or two old.

acquires a degree of irritability, which renders the interval between each operation of considerable length. Sometimes, even the repeated operation of couching excites long continued inflammation. In such cases, therefore, it is obviously desirable to shorten the time of recovery, and to render the repeated use of the couching needle unnecessary; especially if the substance of the cataract can be removed with as little risque, or pain to the patient, as attends the use of that instrument. With this view, I have been in the habit of performing the operation, which will be presently described.

Every surgeon, who is accustomed to the operation of couching, cannot well fail to be aware, that he has a soft cataract to act upon, when he has felt the slight resistance, which it gives to the couching needle, and observes how little change, in many cases, the instrument makes in its appearance. In these cases, when the removal of the cataract from the axis of

vision cannot be effected, on account of its softness, it should be the aim of the operator to rupture, most freely, the anterior part of the capsule, and to break down the substance of the cataract, by passing the couching needle cautiously through it, in different directions, that the aqueous humour may more readily act upon it, and reduce it to a pulpy state. When this has been effected, and the eye has perfectly recovered from the operation, the surface of the cataract will probably have put on a flocculent appearance, and be fit for extraction.

In performing this operation, the patient is to be seated and secured in the same manner, as for the extraction of a cataract. The cornea-knife of the largest size is then to be introduced through the cornea, towards the outer angle of the eye, at the usual distance from the sclerotic coat. If there should be any doubt of the free laceration of the anterior part of the capsule of the lens, the point of the cornea-knife

should be directed obliquely through the pupil, so as to make a more free division of it. All pressure upon the eye-ball must now be carefully avoided, and the cornea-knife gradually withdrawn, which is attended with the evacuation of a part of the aqueous humour, and some portion of the cataract. The curette is next to be introduced through the incision, and advanced towards the pupil, by which the whole of the cataract may commonly be removed by degrees, in a pulpy state, so as to render the pupil perfectly clear. Its removal is generally much facilitated, by gentle pressure towards the vitreous humour, with the convex surface of the curette, whilst the point is inserted through the pupil. Sometimes, however, the cataract is not reduced to a sufficient degree of softness, by the action of the aqueous humour; and this state makes its removal more slow, but seldom renders the repetition of the operation necessary. For when a considerable portion of the cataract has been removed, the remainder is generally ob-

served to be so much reduced in bulk, before the fit period for another operation, as to ensure its speedy disappearance.

The period necessary to reduce a soft cataract to such a pulpy state, as is best adapted for its extraction through the cornea, is somewhat various. Generally speaking, as soon as the irritation, produced by the operation of couching, has subsided, the cataract will be in a proper condition to be removed. When very little irritation has been produced by the needle, the puncture of the cornea may be performed in two or three weeks.

Some judgement may be formed of the change in the consistence of the cataract, by its appearance. When the proper change has taken place, it generally presents an unequal or flocculent surface. The same change may be expected, when small light fragments are observed to pass through the pupil, into the anterior chamber of the aqueous humour. A considerable part of

the cataract occasionally appears to be too solid for removal, upon the introduction of the curette, and only a small portion escapes in a pulpy state. Although the centre of the cataract is sometimes much more solid than the rest, and forms an impediment to its removal, yet, much oftener, the whole is a deception, and arises from the smallness of the aperture in the anterior part of the capsule of the lens, which only allows an inconsiderable part of the cataract to pass out at a time; the capsule in this case having been tougher than usual, and not easily lacerated in the preparatory operation with the couching needle. When this impediment occurs, the opening may be extended, either by means of the curette, or by the introduction of the small hook: or the capsule (should it be uncommonly firm) may be divided, with the iris-scissars, so as to enlarge the aperture.

By this operation, the repeated use of the couching needle may be safely super-

seded; and, as far as my experience extends, with less risque of inflammation or injury to the eye, than attends the employment of that instrument. In many instances, no trace of inflammation, or of any operation could be seen on the eye the next day; nor has the iris ever been injured, or even irritated in the slightest degree, by the use of the curette.

Some practitioners, who have not been in the habit of using the cornea-knife, or operating upon the cornea, may probably be surprized that a considerable puncture should produce so little inconvenience. But that such is the fact, I am convinced by the experience of numerous operations, performed with different views, not only when the cornea was in a healthy state, but where it was considerably diseased. In a case of amaurosis, which I attended some time ago, the insensible state of the retina appeared to be influenced by internal pressure. The cornea, although perfectly transparent, was more prominent than na-

tural, and the eye-ball felt to the touch unusually hard, as if its coats were put upon the stretch by the too great quantity of their contents. In this case, where vision was entirely lost, I thought it a justifiable experiment to try the effect of occasionally evacuating the aqueous humour.

This operation was performed upon the same eye twice weekly; and, at the moment, was attended with a confused perception of light, which gave me hopes that it might be finally successful. No benefit, however, was derived from it. The incision in the cornea so speedily closed, and the aqueous humour was so soon regenerated, that the suspension of the pressure was probably too temporary to produce any beneficial effect. I have repeated this operation in various cases, with no better success, but never experienced the smallest ill consequence from the puncture of the cornea.

Another state of the eye, in which I

have employed the puncture of the cornea, is, where, in consequence of violent and long continued ophthalmia, the vessels of the cornea have become permanently enlarged, attended with considerable chronic inflammation. In several cases of this kind, I had in vain tried every plan, which has been proposed by the best authors. The division of individual vessels, and even the circumcision of the conjunctiva, as recommended by Mr. Ware, was of little use; for many of the vessels appeared to be deeply seated in the substance of the cornea itself. In such cases I have employed repeated punctures, by which every part of the cornea was in succession cut off from all communication with the sclerotic coat. The success of this attempt, however, was only such as might have been expected from the free anastomosis, which generally exists amongst the enlarged vessels of the cornea; for they were decreased in size, but not obliterated. Although, in these cases, the cornea was in a morbid state, yet the

effect of frequent punctures* was never that of producing more than a slight and temporary irritation.

From much experience, therefore, of the puncture of the cornea, I have found it to be an operation productive of the slightest possible injury to the eye; and I would recommend its adoption in extracting the soft cataract, after the couching needle has been employed without success, upon these grounds; that it generally accomplishes at once, what might require the introduction of the couching needle several times; and that it is attended with less risque and irritation to the eye, and gives the patient less pain.

Another circumstance, which might be apprehended during the extraction of a soft cataract through a puncture in the

* See Mr. Wardrop's excellent observations on the effects of the puncture of the cornea, and the evacuation of the aqueous humour, in an inflamed state of the eye-ball.

cornea, is the escape of a part of the vitreous humour. As the success of this operation much depends upon the free laceration of the anterior part of the capsule of the crystalline lens, and as its posterior part must have been previously lacerated by the couching needle, in breaking down the substance of the cataract, it might be imagined that there would be so little impediment to the escape of the vitreous humour, towards the latter part of the operation, that a considerable quantity would be lost. This, however, has, in no instance, occurred to me in performing this operation. Such an accident, indeed, is scarcely possible; for as soon as the aqueous humour has been evacuated, the iris falls into contact with the internal surface of the cornea, and forms a kind of valve, which completely closes the puncture; so that there is no passage for the removal of the soft cataract, until the curette is introduced. The point of this instrument, also, must occasionally be pressed a little backwards, that a more free exit may be

allowed for the fragments. As soon as the pupil appears clear, and the vitreous humour is seen, the curette is to be withdrawn, so as to obviate any risque of such a loss. If, indeed, the strenuous advocates for the unconditional employment of the couching needle did not appear to have so unnecessary a dread of this accident, as to anticipate its occurrence even in this operation, I should have been spared the pains of obviating so groundless an apprehension.

On the subject of this operation I shall decline offering any cases, since they would merely consist in a repetition of the description of it, which has already been given. It may be observed, however, that the operator, in all cases, should pay particular attention to rupture the anterior part of the capsule of the crystalline lens as freely as possible, at the time of breaking down the substance of the cataract. The aqueous humour, by this means, will be allowed

to act most advantageously in reducing the cataract to a proper degree of softness.

If any opacity should be observed in the capsule of the lens, this membrane must be removed, by the means pointed out in the next section.

SECTION THE FOURTH.

On the Extraction of several kinds of Membraneous Cataracts, through a Puncture in the Cornea.

THE next state of the eye, which may be relieved through a puncture in the cornea, is an opaque state of the capsule of the crystalline lens, forming what has been termed a membraneous cataract. This kind of cataract has various degrees of consistence; and I shall briefly notice the varieties, which have come under my own observation.

One variety of this species of cataract exists at birth, or is congenital. In this case, there is reason to believe that the diseased part was, originally, merely the capsule of a milky cataract, from which, in consequence of the operation of some internal cause, the fluid portion has been absorbed, leaving only the opaque capsule.* This conjecture I am induced to form from the following case. A child, who had been born blind, was struck towards the internal angle of the right eye by the end of a blunt stick. Its parents were alarmed by the sudden change in the appearance of the eye, and brought the child to me. On examination I found that the anterior chamber of the aqueous humour had assumed a muddy white appearance, so as entirely to obscure the iris. On examining the other eye, I found a cataract, which from its aspect, and from its being congenital, I concluded was of the milky kind. The effect of the blow was easily

* See Case I.

explained by these appearances. The sudden concussion on the injured eye had ruptured the capsule, which contained the milky cataract; hence it was diffused through the aqueous humour, and rendered the whole white and turbid. The blow had done no injury to the eye externally, and in two or three days the aqueous humour assumed its usual transparency. On inspecting the eye, I observed the rent through which the fluid had been discharged; but the capsule was opaque, and, in a few months afterwards, it assumed the appearance, which I have several times observed in membraneous cataracts, that have subsisted from birth.

The membraneous cataract, when congenital, possesses various degrees of consistence, and exhibits different appearances. It is sometimes soft and almost pulpy; sometimes brittle and easily ruptured. At other times, although very thin, it possesses considerable elasticity. Along with these properties, it has occasionally a

strong attachment to the capsule and to the anterior surface of the vitreous humour, which is more firm in its consistence than usual. Hence when an operator has ruptured and depressed this kind of membraneous cataract, it springs up again, as if it possessed great elasticity; but in reality its attachment to the vitreous humour, which is moved along with it, is the cause, why it so suddenly springs up again and returns to its former position, as soon as the couching needle is withdrawn, and why it is with difficulty detached. The appearance of elasticity is by no means peculiar to this kind of membraneous cataract. In two or three cases, I have found this membrane of considerable thickness, very much resembling the cornea, when it has been long immersed in water. These instances occurred in adults, from thirty to forty years of age. I have not been able to ascertain, whether this species of membraneous cataract undergoes any change in its density, toughness, or other qualities, by remaining many years within the eye. It is probable, however, that

some alteration takes place in its structure, since it is generally found of more tender fabric in infants, than in adults.

Other varieties of the membraneous cataract are those, which exist previously to the extraction or depression of the lenticular cataract, or are formed subsequently to these operations. In these varieties of cataract, I have observed, almost all the properties possessed by the former, except great softness, and considerable thickness similar to that of the cornea. In addition to these, I have met with one kind partially ossified; so that it felt gritty to the couching needle, and produced a noise, as if the instrument passed over a piece of dry parchment. I have also seen a membraneous cataract* reticulated, and almost as fine as a spider's web. This variety occurred a few months after the operation of extraction, and appeared, upon dissection, to be a new production from the capsule of the vitreous

* See Case II.

humour, rather than a change in texture of the capsule of the crystalline lens.

In two instances, I have seen the membraneous cataract* exhibiting a very slight degree of opacity, except in the centre, which was occupied by a speck of a deeply opaque substance of considerable firmness. Although of no greater diameter than a moderate sized pin's head, it produced a much greater defect in vision than might have been expected. When extracted, the opaque speck was found to resemble cartilage in its consistence.

With respect to the appearance of the membraneous cataracts, which have been noticed, some are pearl coloured and glistening; others of a dull milky whiteness: others again are mottled with small white spots upon a darker ground. Sometimes there are two or three large white specks, instead of the mottled

* See Case III.

colour. In fact, their appearance is too diversified for accurate description.

Another species of membraneous cataract differs from all the former, in being complicated with the neighbouring parts. In most instances, the eye-ball must be considered to be, in other respects, natural; but in this, the membraneous cataract adheres closely to the inner border and posterior surface of the iris, rendering the pupil immoveable, and frequently diminishing its diameter in a great degree. In general, the other varieties of membraneous cataract arise spontaneously, and can be attributed to no particular cause. But in the present case, the cause is obvious, and we have an opportunity of observing the disease in all its stages.

For the most part, it commences with violent inflammation of the tunica conjunctiva, attended with intolerance of light, and deep-seated pain in the eye-ball and forehead. On inspecting the eye minutely,

the capsule of the crystalline lens may be observed to be slightly opaque, and this increases until the patient is deprived of all useful vision. The iris, at the same time, gradually begins to exhibit marks of inflammation. It loses its usual polish, and assumes a more dusky hue; and, on close inspection, some of its vessels may generally be seen turgid with blood, and a narrow red rim may be observed near the border of the pupil. At this period, small filaments of coagulating lymph begin to pass, through the pupil, into the anterior chamber of the aqueous humour. At length, if active means have not been employed, and sometimes even in spite of the best treatment, as the inflammation subsides, the posterior surface of the iris becomes closely united to the capsule of the crystalline lens, which remains permanently opaque, and forms the variety of membraneous cataract now under consideration. The crystalline lens usually partakes of the general disease, and also becomes opaque: in one case I

found it of a golden yellow.* Sometimes, however, it retains its natural transparency. Whether this be the fact or not is immaterial, as its removal becomes absolutely necessary, before vision can be restored.

These varieties of the membraneous cataract, as far as I can judge, may be removed, with more certainty and less risque, through a puncture in the cornea, than by the modes of operating now in use.

I have been much disappointed in not having been able to ascertain, with any precision, the texture and consistence of a membraneous cataract, by merely inspecting the eye. Appearances, which in one case attended a tough or brittle substance, have been exhibited, in another case, by a soft membrane. I have frequently observed, however, that when the membraneous cataract has a shining surface of uniform colour, it is generally tough or brittle.

* See Case IV.

This is also occasionally the case, when it is mottled, or has two or three large white specks, on a darker ground. When the membrane is of a dull muddy white colour, it is more frequently soft and easily broken down. That species of membraneous cataract, which has a reticulated texture, resembling a spider's web, I have always found of very delicate fabric. It occasionally gives way to a slight touch of the cornea-knife, or is ruptured in consequence of the loss of a part of the aqueous humour. When the membraneous cataract has formed adhesions to the iris, it is almost always tough, and not easily penetrated by the common couching needle.

From the inadequacy of the means of ascertaining the nature of a membraneous cataract by inspection, the operation for its removal might be supposed to rest on uncertain grounds. But, fortunately, this is not the case. For the same kind of

operation is often equally well suited to the removal of membranes of different textures. The principal difference, which I have observed in operating, is, that some membraneous cataracts are removed with more facility than others; one species requiring merely the hook to extract it, another the use of the forceps or scissars.

The variety which I shall select for explaining the mode of operation, is a simple membraneous cataract, which has not contracted adhesions with the iris; but has either existed from birth, or has remained after the extraction or depression of the lenticular cataract.

In such a case,* the point of the cornea-knife, after penetrating the cornea, is to form a small puncture in the membraneous cataract, as near as possible to the margin of the iris, towards the external angle of the eye. The knife is then to be gently

* See Case II.

withdrawn, and, by the escape of a part of the aqueous humour, the pupil becomes dilated, by pressure *a tergo*, and the puncture in the membraneous cataract is sometimes a little enlarged. Through this puncture the small hook is to be passed, behind the opaque membrane, with its point directed downwards, until it reaches the opposite part of the membraneous cataract, next the internal angle of the eye. The point of the hook is now to be directed forwards, and is to be passed through the membrane, so as to lay hold of it. By gently drawing, with slight extracting efforts towards the opening in the cornea, the whole, or a considerable part of the opaque membrane may generally be removed, if it possess a moderate degree of firmness. If the membrane be found of a different texture, the operator, having now ascertained its nature with the hook, must vary the operation accordingly. If it should be soft and pulpy, it may be easily broken down with the hook, and removed by the curette or forceps. The reticulated

species of membraneous cataract is, of all others, most easily removed by the hook. In two cases, (as I have already observed) the membrane possessed the toughness and thickness of the cornea, so that no puncture could be made in it with the cornea-knife. The hook, in these cases, was passed along its anterior surface, until it reached the edge of the membrane next the nose; this mode of applying the hook may be used in all necessary cases, but I have found from experience, that a larger portion of the membraneous cataract may be extracted, when the hook is introduced behind it. The hook is also more easily withdrawn in this case; for its point being turned towards the cornea, no risque is incurred of its being entangled with the edge of the iris.

Some slight impediments occasionally arise to the completion of this operation. It sometimes happens, that a membraneous cataract has so strong an attachment to the capsule of the vitreous humour, and is of

so brittle and untoward a nature, that the hook, instead of extracting any considerable portion, merely makes a rent in it. In such a case, the hook should be passed, two or three times, through its substance in different parts, so as to divide it into several strips; after which the membrane, thus divided, may generally be removed by the forceps without difficulty. In some cases, it may be necessary to use the iris-scissars to divide the cataract, when it cannot easily be laid hold of by the hook from its toughness, or to clip off fragments, whose attachment is very firm. In one case, the membraneous cataract was so thick and bulky, that it became necessary to enlarge the puncture in the cornea, before it could be extracted. In another case, a part of a membraneous cataract formed a very tough cartilaginous knob, which adhered so firmly to the inner surface of the iris, near its border, that every attempt to lay hold of it with the hook, or to clip it away with the iris-scissars, was ineffectual. In this case, I formed an artificial pupil.

Although the hook is generally the instrument, best adapted to extract a membraneous cataract, the forceps* may frequently be employed with advantage. In using them, they are to be introduced shut through the incision of the cornea; and when the blades have reached the edge of the membrane, they must be opened, and one blade passed through the puncture, (already made in the cataract with the cornea-knife); the other blade is, at the same time, to be passed between the membrane and cornea. In this way, they must be advanced towards the inner angle of the eye, until they embrace the whole breadth of the membraneous cataract, which appears through the pupil. Gentle efforts must next be made to extract the cataract, by moving the points of the forceps in different directions. By this means, a sufficient portion of the cataract may generally be removed. If this attempt should not entirely succeed, the

* See Case I.

forceps may be again introduced. Sometimes a considerable portion may be brought away, by turning the forceps gently round between the fingers, so as to twist off the membrane. This may be the more easily effected, because the forceps are kept shut by a spring, so as to leave the fingers at liberty.

In the removal of these different species of membraneous cataracts, the operator, with a little attention, will readily adopt the mode and instrument best suited to the case.

In the last kind of membraneous cataract,* which I have to notice, the operation is more precise. The edge and posterior part of the iris, in this case, adheres in a great measure to the opaque membrane; the pupil, at the same time, remains sufficiently large in general, so that it is rarely necessary to remove any part of the iris. This kind of membraneous cataract generally possesses considerable toughness, so

* See Case IV. Sect. IV.

that I have seen the iris pressed forwards along with it, until it almost touched the inner surface of the cornea, whilst no impression could be made on the membrane with the couching needle. An opacity in the lens generally accompanies this species of cataract, with a flat cornea, and a scanty quantity of aqueous humour. The iris also is frequently more vascular than usual. In a few instances, I have found the crystalline lens previously absorbed: in these cases, either the superior part of the eye had received a blow; or the cornea and capsule of the lens had been accidentally punctured with a small sharp instrument.

The operation, for removing this kind of membraneous cataract, is very similar to that which has been described, when the iris was so far closed as to require the formation of an artificial pupil. The first step is to depress, or break down the crystalline lens, if it be present: for whether the lens be opaque, or not, is of no consequence, whenever its capsule is diseased. When the

eye has perfectly recovered from the effects of the couching needle, a puncture is to be made through the cornea in the usual way, and the point of the knife is to be passed through the edge of the opaque membrane, as near as possible to the border of the iris, towards the external angle of the eye. Having withdrawn the knife, the iris-scissars are to be introduced, in the manner pointed out at page 131, and as much as possible of the capsule is to be removed by their means. In this case, the toughness of the membrane and its complete adhesion to the iris render the hook almost useless. By making a snip or two, with the iris-scissars, first at the inferior edge of the membrane, and afterwards at its superior edge, the flap thus formed may be removed with facility, so as to leave the pupil almost free from capsule. If any small jagged portions should remain, they may be extracted with the forceps.

This completes the operation in those cases, where the lens was hard enough

to bear depression. Where it was soft, and merely broken down, as much as possible of its substance, (now probably become soft and pulpy) should be extracted by the curette, through the pupil. The remainder generally disappears in a short time, by the action of the aqueous humour; or it may be removed through a second puncture of the cornea, should the process be too tedious.

This operation is, in general, confined to the removal of the membraneous cataract alone: but should that appear, previously, not likely to form a pupil of a sufficient size, or should any circumstance indicate a disposition in the pupil to close, a small part of the border of the iris, towards the external angle of the eye, should be removed along with the membraneous cataract.

CASE THE FIRST.

MR. G. of Altringham, applied to me in his forty-first year, for a defect in vision, which had subsisted from birth. Upon enquiry, I found, that he had had congenital cataracts, one of which a foreign oculist had attempted to remove at an early period, with the large spear-pointed couching needle, by which the eye was almost destroyed.

Some years afterwards, his friends put him under the care of a surgeon of this place, who, with the same kind of instrument, ruptured the capsule, in which

the milk-like fluid was contained, but was not successful in removing the capsule itself, which was opaque and of a muddy white colour. In this state, things remained until Mr. G. applied to me about five years ago. The opaque capsule, or membraneous cataract, then entirely occupied the pupil; but was free from any adhesion to the iris. His vision was such, as is usual in these cases. He could walk to well-known places, could point out the more vivid colours, and distinguish, without difficulty, different shades of light.

The steps of the operation were such as have been described. The cornea was punctured, and the point of the knife passed through the opaque capsule, as near as possible to the border of the pupil, next the temple. Through this aperture one blade of the forceps was introduced behind the capsule, whilst the other blade was passed anterior to it; until the whole diameter of the opaque membrane, which occupied the pupil, was included between them.

The forceps were then closed, and the membraneous cataract extracted by gentle and repeated movements, so as to leave the pupil free from all obstruction or opacity. No inflammation followed, and my patient returned home in a few days.

In this case, as I have frequently had occasion to observe in persons blind from birth, the degree of vision, which resulted from the operation, was not so great as might have been expected. My patient's sight was, however, considerably improved, and it would have been much more beneficial to him, if he had been able to overcome an aversion to the use of glasses.

In one case, similar to this, but with a more contracted pupil, I thought it adviseable to form the aperture in the membraneous cataract, on the side next the nose. In retracting the cornea-knife, I pressed its point a little backwards, towards

the vitreous humour, and very unexpectedly dislodged the whole of the membrane. The pupil immediately became larger; from which circumstance it is probable, that it had been bound by some slight adhesions, previously to the operation. This patient went home in a week, free from all irritation, and was able to read. He returned, several weeks ago, for the purpose of having a lenticular cataract removed from the other eye. The eye being much sunk in the orbit, Mr. Hey's couching needle, was employed to depress the cataract, which was effected without delay or difficulty. I mention this case, because it contrasts, in the same patient, the different effects produced by the puncture of the cornea, through which a membraneous cataract was extracted; and a successful depression of a lenticular cataract, where the operation was apparently performed, with as little injury to the eye, as possible. For it happened in this case, (as I have many times observed) that severe inflammation was produced by

the use of the couching needle, which continued more than a month, without much abatement, although very active measures were employed to subdue it. The eye, (at the time of writing these pages) still continues much inflamed, with shooting pains in the head and the appearance of moats.

CASE THE SECOND.

MR. W. B. from Saddleworth, came to Manchester to consult me, with respect to the state of his eyes. On examination, I found a lenticular cataract in his right eye, and in his left, a fine reticulated membrane, resembling a spider's web, which closed the pupil and considerably obstructed vision. Upon enquiry, I found that he had undergone the operation of extraction in the left eye, and that a large staphyloma of the iris had projected through the incision in the cornea, through which the cataract had been extracted. Whilst the

incision was healing, the upper part of the pupil had been gradually drawn downwards, until it came to be opposite to the lower half of the cornea. It still, however, possessed considerable power of motion, and appeared capable of admitting a sufficient quantity of light to produce tolerably distinct vision, if the reticulated membrane, which closed it, were withdrawn.

In operating upon this case, the incision in the cornea was made smaller than usual: this sort of membrane having very little bulk. The hook was next introduced through an opening, made in the cataract by the knife, so as to lay hold of the edge of the membrane, next the nose, and its entire substance was extracted. No appearance of inflammation followed. As my patient had entirely given up the recovery of this eye I expected that a scanty degree of vision would be highly satisfactory to him. I made, however, a very erroneous estimate of his expectations; for although he could read in a few

hours, with the help of cataract spectacles, he observed, that "he did not see so well as he expected."

It occasionally happens, that this delicate membrane bursts, before the introduction of the hook, in consequence of a small discharge of the aqueous humour. Although the vitreous humour, after this occurrence, should appear perfectly clear, through the rent, still every convenient portion of the membrane should be extracted, because its fragments generally return to their former situation, when the eye has resumed its plumpness; and, consequently, no benefit is derived from the operation.

CASE THE THIRD.

MILLICENT Smith applied at the Manchester Infirmary, on account of a considerable defect in the sight of one eye, the other having been destroyed some years before. On examination, an opaque speck was observed in the centre of the capsule of the crystalline lens, surrounded by a slighter degree of opacity, of small extent. This state of the capsule occasioned a greater defect in vision, than might have been expected, especially as the eye appeared quite healthy in other respects. Although the crystalline lens, in this case,

was, most probably, free from opacity, yet its removal was necessary; because the speck and opaque portion of its capsule could not have been removed, without producing opacity in it.

The operation, therefore, consisted in first attempting to depress the lens; this, however, proving too soft, was broken down with the couching needle, and its capsule freely ruptured to admit the aqueous humour. When the eye had recovered, a puncture was made in the cornea, through which the lens was removed in a soft state by the curette, and the speck and opaque capsule were extracted, partly by the hook, partly by the forceps. The pupil became quite clear, and the girl left the hospital with as good sight as patients usually enjoy, after the removal of the crystalline lens.

CASE THE FOURTH.

JAMES Cocker, aged thirteen, became a patient of mine, at the Manchester Infirmary, in April 1805. He had lost the sight of the left eye,* several years before, from violent inflammation. In the right eye considerable derangement had taken place. The capsule of the crystalline lens was opaque, and adhered closely to the inner border and posterior surface of the iris,

* In almost all the cases, upon which I have operated, the right eye has been destroyed. From paying attention to this point, I find it to be generally the case, although different statements have been given of this fact.

so as entirely to prevent the motions of the pupil. Small red vessels could be discerned upon the surface of the capsule; the crystalline lens also was opaque, and had become of a bright yellow colour. The eye was healthy in other respects, and the boy could easily discern objects, which were moved between the eye and a window.

The plan, which was adopted in this case was, first to depress the crystalline lens, with Mr. Hey's couching needle, which was easily effected. No inflammation was produced by this operation. In a fortnight afterwards, I made a puncture with the knife, through the cornea, in the usual place, at the outer angle of the eye, and formed also a small opening through the corresponding edge of the opaque capsule. The iris-scissars were next introduced through the cornea, and one of their blades was passed, in the usual way, through this opening in the opaque capsule of the lens, whilst the other was advanced anterior to that mem-

brane, which was clipped from the iris, by several snips of the scissars, so as to leave a very regular pupil.

The vitreous humour, in this case, was thinner than natural: but although a portion escaped, which rendered the eye flaccid immediately after the operation, yet its want was speedily supplied, by the secretion of aqueous humour. No inflammation followed, and in three days after the removal of the opaque membrane, the patient could see the second hand of a watch.

In this species of membraneous cataract, the crystalline lens sometimes disappears entirely, without the performance of any operation. A small aperture, or partial transparency of the membraneous cataract, towards its edge, occasionally affords a surgeon the means of detecting this state.

To the facts which have been communicated, respecting the foregoing operations, I have only few general observations to add. It may, however, be remarked, that, although the operations differ materially from each other in some points, yet they have one circumstance in common, viz. the small incision, which is made in the cornea. It is principally to this circumstance, that I attribute the rare occurrence of any inflammation, either after the formation of an artificial pupil, or after the extraction of a soft or membraneous cataract. By the adaptation of instruments, to operate upon the internal parts of the eye, through

so small an aperture, it appears to me, that not only the inflammation of the cornea, which sometimes results from a more extensive division of that membrane, in the operation of extraction ; but also the less frequent, yet generally more obstinate and destructive inflammation of the internal parts of the eye, which the couching needle occasionally induces, are avoided with equal certainty.

The very mild effects, produced by the performance of my first operations, particularly those for removing a portion of the iris, created in my mind no small surprize ; as I had every reason to anticipate considerable inflammation and disturbance. The experience, however, of many subsequent operations gradually proved, that such apprehensions were groundless, and that a contrary result might be uniformly expected.

In preparing this treatise for the public, a principal object has been, to give as

clear a description of the several modes of operating, and as impartial a statement of their proportional success and failure, as lay in my power. If this attempt should not have succeeded, these observations will probably incur some share of disapprobation. For the operations have not been concealed within the knowledge of a few individuals; but have, on the contrary, been witnessed by most of the respectable practitioners in this town and neighbourhood, as well as by a constant succession of the house-surgeons and pupils in an extensive hospital, to whom I have always been more solicitous to explain their nature, than to proclaim their success.

Plate I.

Fig 2

Fig 1

Fig 3

J.A.Ransome del. Warner Sc.

Plate II

Fig 1

Fig 2

Fig 3

J.A.Ransome del. Warner Sc.

THE

EXPLANATION OF THE PLATES.

PLATE THE FIRST.

THIS plate contains a delineation of the Hook, Forceps and Iris-scissars, of their full size. The scissars are here represented with one point blunted; but a pair with both points blunted is, in many instances, better adapted for the formation of the artificial pupil.

These instruments are made by Savigny and Co. and nearly resemble, in shape, a pair of forceps and scissars delineated in Brambilla's plates of instruments, but employed for a different purpose. The latter instruments were pointed out to me some time ago, by Dr. Flajani, physician to his Holiness the Pope, upon shewing him those, which had been constructed for me by Mr. Savigny.

PLATE THE SECOND.

FIGURE the first of this plate represents the appearance of Henry King's eye,* after the formation of an artificial pupil. An opacity of considerable extent will be observed to occupy the centre of the cornea, and the artificial pupil will be easily recognized towards the external angle of the eye. This view exhibits the general shape of the opening, which results from clipping off a protruded bag of the iris, and gives a proper idea of the necessary size of the new pupil.

FIGURE the second exhibits the appearance of Captain F's eye† after his recovery from the effects of an operation, in which the hook was employed. The opacity of the cornea is more extensive than in the last view, particularly towards the inner angle of the eye. The artificial pupil was not formed exactly opposite to the external angle of the eye, but rather below it. An attempt has been made to express, in this and the succeeding view, the plaited or puckered appearance, which the iris generally exhibits, when it has contracted adhesions to the internal surface of the cornea, or when the pupil has been entirely closed.

* See Case I. Sect. II.

† See Case II. Sect. II.

The appearances exhibited after operations third and fourth differ in no material respect, from the views which have been given; it was therefore thought unnecessary to represent them.

FIGURE the third represents the appearance of William Crooke's eyes,* some time after operations for forming an artificial pupil in each, on account of a total closure of the natural pupil. As the cornea, in this instance, was perfectly free from opacity, the new pupil was formed, as nearly as possible, in the centre of the iris of each eye.

In order to expose the whole cornea to view, the eye-lids in these drawings, are represented more open than is natural.

* See Case V. Sect. II.

FINIS.

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