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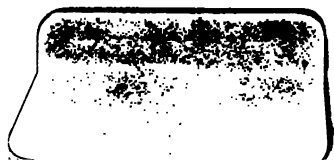
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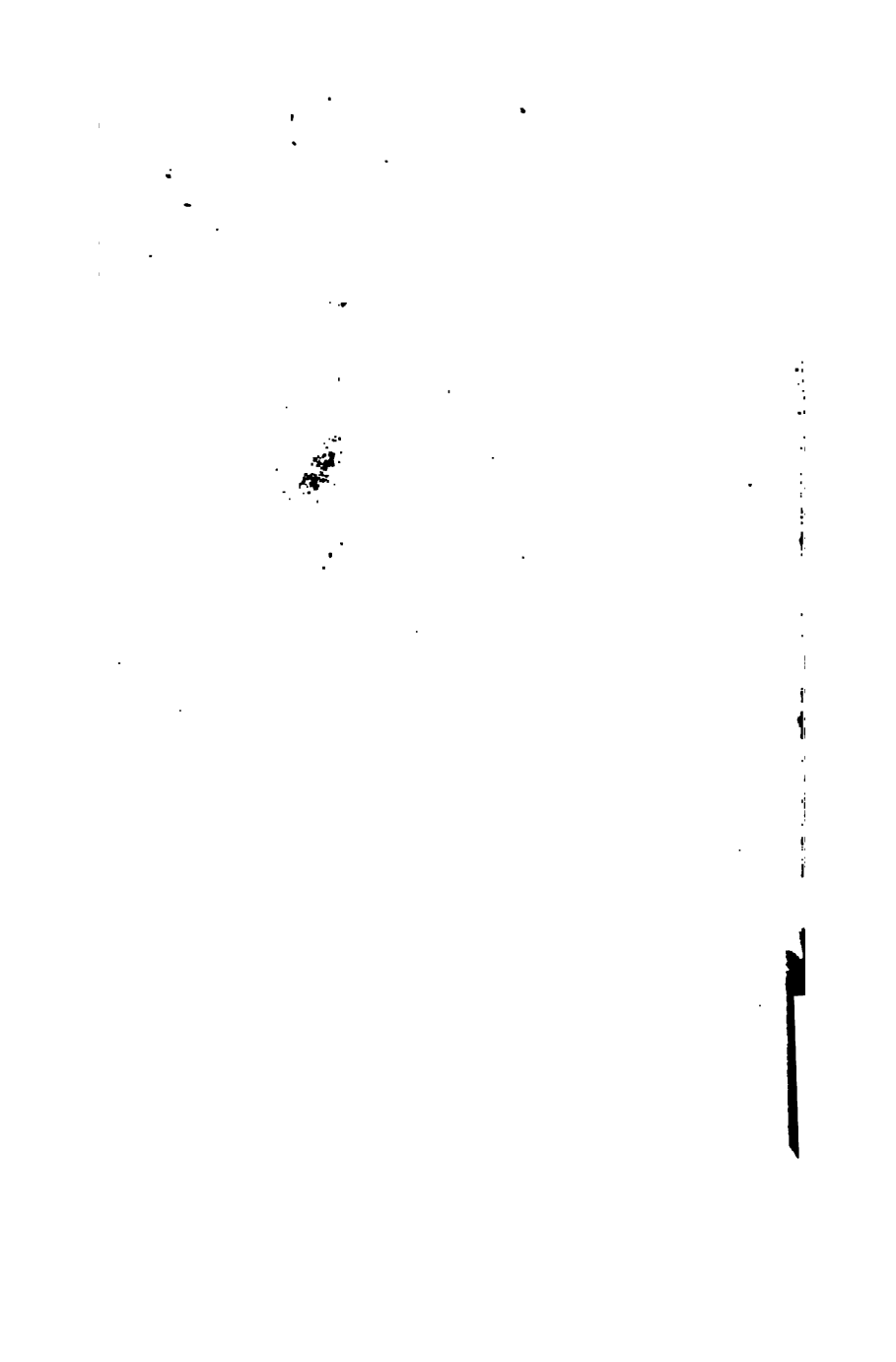
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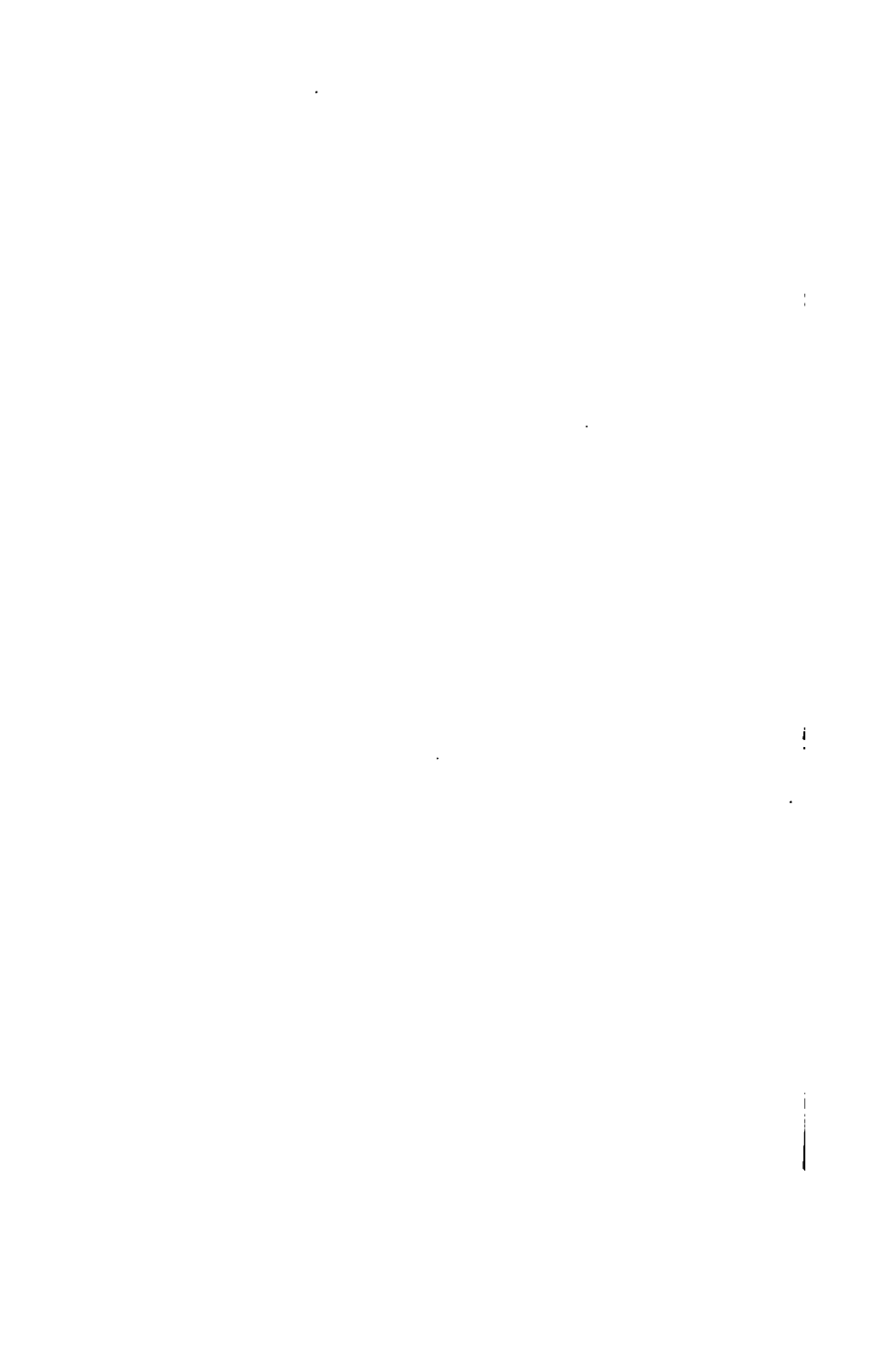
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THE  
OCULIST'S VADE-MECUM;

A  
COMPLETE PRACTICAL SYSTEM OF  
OPHTHALMIC SURGERY.

SECOND EDITION,  
CORRECTED AND IMPROVED.

29

BY  
JOHN WALKER,  
LATE SURGEON TO THE MANCHESTER EYE-HOSPITAL.



LONDON:  
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160. c. 56.





## INTRODUCTION.

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THE Ophthalmic branch of Surgery is universally admitted to be of the very highest interest, and the deepest importance, involving, as it often does, the question,—Whether sight—the most valuable of the senses—is to be maintained or destroyed.

Under the term Ophthalmic Surgery, is included, not merely the operative and manual proceedings, but likewise the employment of such remedies, both local and general, as may be necessary for preserving or restoring the functions of the visual organs, when in a state of disease.

The diseased conditions that are observable in the eye are both numerous and varied. We are not, however, to suppose, because a great number of names are employed to designate them, that there is a corresponding variation either in their nature or in the treatment they require.

The eye is but a diminutive organ, yet such is the peculiarity of its functions, that it not only has a supply of most of the ordinary materials which enter into the construction of other parts, but likewise possesses several textures which are not met with elsewhere, such as the cornea, the chrySTALLINE lens, and the choroid membrane. So that, in considering the diseases of this organ, we must expect to find that, although there is a general resemblance between them and those met with in other parts of the system, there are also some peculiarities.

We shall find, as we proceed, that inflammation is more or less connected with the vast majority of ophthalmic affections. But inflammation in one texture exhibits a series of phenomena somewhat different from that it exhibits in another; and, as there will often be a considerable difference in the treatment required, it behoves us to be extremely careful in discriminating the inflammatory conditions of each individual texture of the eye.

But, besides inflammation, various other morbid states frequently come under the cognizance of the oculist, as, for example, that vitiated condition of the crystalline body termed cataract, paralysis, fungoid diseases, and the like. The visual organ is likewise very frequently the subject of various injuries and malformations, all of which will require to be carefully investigated.

It forms no part of the object of this treatise to enter into abstruse disquisitions on the nature of those actions which give rise to the phenomena of ocular disease, but rather the more practical one of describing, as accurately as possible, the phenomena themselves, their causes, and, more especially, the treatment they require.

In pursuing this object, I shall give a detailed account of what is most important on each of these topics, in relation to the various diseases of each individual structure of the eye, commencing with those which are external, viz., the conjunctiva, the cornea, and sclerotica; and afterwards proceeding to those which are deeper-seated,—the iris, the choroid, and the retina. After these will follow the considerations of the affections of the aqueous, crystalline, and vitreous humors, and of their capsules.

Having disposed of the diseased conditions of the individual parts, the reader will be prepared to enter on the subject of those which simultaneously involve the whole, as well as those few anomalous affections, which from the uncertainty attaching to them as to what parts they really affect, could not properly be classed with the preceding. Lastly, the morbid states, of the appendages will claim a portion of his attention.

This arrangement appears to offer many advantages, as with it no affection of any importance can well escape notice; although, on the other hand, it necessarily occasions a certain amount of repetition, particularly as regards the principles of treatment.

In the account of the various diseases I shall have to give, it is not my intention to go into lengthy details, so as to weary the attention of the student, if not to bewilder him, but rather to present to his view the more prominent features and facts of ophthalmic surgery, such as will be servicable in enabling him to come to a practical conclusion as to the nature and treatment of each individual case that may come before him.

In written descriptions of disease, the symptoms are always laid down with much greater regularity and order than are observable when we investigate the diseases themselves. Hence, the discrimination of the

particular varieties of ocular disease is not always the simple business it is apt to be regarded from the mere perusal of systematic treatises upon this subject. A difficulty arises from authors usually describing diseases in their elementary forms, whereas practitioners oftener see them in their more complicated states. Thus inflammation seldom affects one particular structure only: on the contrary, we often find that it affects several simultaneously. When this latter is the case, there is usually, however, a considerable degree of regularity noticeable in the order in which the parts become consecutively affected; as, for example, when the conjunctiva is inflamed, the cornea is also likely to become involved in it; when the sclerotica is inflamed, then the iris is likely to fall into the same condition; and similarly, as far as we can judge, with respect to the deeper seated textures. In some instances, indeed, we find both the first and second orders of textures simultaneously inflamed; and, occasionally, all are implicated in the disordered action, without our being able to say which was the texture primarily affected.

In speaking of the various compound affections, it is customary to designate each from the more important texture affected, or from that in which the symptoms are the most developed, as if it were alone the seat of the disease. Thus, in the case of inflammation of the iris, the sclerotica is almost certain, in some measure, to partake of the diseased action, but the iris being the more important texture, the disease is termed simply iritis; so, with the cornea, if the conjunctiva be less affected than the cornea itself, we name the disease corneitis.

## CHAPTER I.

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### DISEASES OF THE CONJUNCTIVA.

THE Conjunctiva, being the outermost of the tunics of the eye, is, perhaps on that account, the most frequently affected with disease. Situated in immediate contact with the atmosphere, it is liable to be influenced by changes of its temperature or of its humidity, as well as by irritating vapours and other foreign matters with which it is occasionally contaminated. From the irritation thus produced, inflammation is frequently excited. Ophthalmia is the generic term which is applied to the various inflammatory affections of the eye, and when inflammation is confined to the conjunctiva and is the result of the slighter causes just mentioned, it is especially denominated either Simple Ophthalmia, or Conjunctivitis.

#### EXAMINATION OF A DISEASED EYE.

Before, however, entering into a detailed account of the various forms of conjunctival inflammation, it may be desirable to make a few observations on the best mode of examining the eye when the seat of this morbid action.

It is obvious that the greatest delicacy ought to be exercised in conducting the process of examination. This is important, not only on account of the feelings of the patient, but also the reputation of the surgeon; for we know that patients often form a favourable or an unfavourable opinion of the practitioner, according as he manipulates the organ in a gentle or rough manner.

The best position for a patient under examination is, seated in a chair with a high and gently-reclining back, against the top of which his head

should repose; the chair being placed either just before or on one side of the window. A room facing the north is to be preferred, as the surgeon is then less likely to be annoyed by the reflection of the sun's rays.

In some cases, the patient will hardly be able to expose the eyes at all to the light; in others he will have no difficulty. It will be proper never to remain satisfied with the examination of merely that part of the eye which is usually exposed to view: on the contrary, we must never omit to scrutinize minutely every part of the surface of the organ. Of course a superficial view must first be taken, but this will not be sufficient. In our special examination, we must first look to the state of the conjunctiva of the cornea; any deviations from the natural condition should be carefully noted.

To obtain a view of the portion of the conjunctiva covering the inferior half of the eye-ball and the inner surface of the inferior eye-lid, is, generally, a matter of no difficulty, when there is no intolerance of light or any morbid sensibility, as, for this purpose, it is merely necessary to place the tip of the fore-finger, keeping the sharp edge of the nail away, against the central portion of the outer surface of the lower lid, just below the ciliary margin, and then draw it gently downwards. Eversion of the lid is produced by this operation.

In order to obtain a view of the conjunctiva of the superior half of the globe, and of that of the upper eye-lid, some nicety of manipulation is requisite, because the upper is much more irritable than the lower eye-lid, and it also possesses a much greater share of mobility. We may, however, usually accomplish its elevation to such an extent as to admit of the upper half of the front of the eye-ball being brought into view, by placing the thumb against the outer surface of the lid, in the same manner as the finger has been directed to be applied to the lower lid, and raising it gently towards the eye-brow, at the same time requesting the patient to turn the eye downwards.

But, though in this manner we may obtain a satisfactory view of the upper half of the front of the globe, we shall not obtain any view of the conjunctival covering of the superior eye-lid. Eversion of this lid must be effected before its inner surface can be brought under examination, which cannot be done by simply elevating it, but may be by the following procedure:—The cilia occupying the central portion of the margin of the lid, are to be laid hold of between

the thumb and fore-finger of the left hand, the back of the finger, at the same time, being placed upon the skin of the lid; then, the cilia and ciliary margin being raised by the thumb, the substance of the lid is to be pushed downwards by the finger, and thus complete eversion of its conjunctival surface will often be readily produced. Sometimes, however, on account of the strong action of the orbicularis muscle, it will be more difficult to produce eversion, and it may be necessary, with the right hand, to employ a probe or some similar instrument to depress the upper and outer portion of the lid, while the thumb and fore-finger of the left hand are used to raise the cilia and ciliary margin, as before pointed out. In this way, we may always succeed in obtaining a proper view of the conjunctival surface of the upper lid.

In examining the eyes of children, however, it rarely happens that we can succeed in inducing them voluntarily to undergo the simple processes pointed out; if there be intolerance of light and much irritability, it is impossible, and we are compelled to resort to the forcible separation and eversion of the palpebræ. The only difference required in the mode of manipulating in this case, is to place the child's head upon or between the knees of the surgeon, while the rest of his body is supported by some other person, who is seated opposite, and who secures the hands, which are otherwise apt to be very much in the way. Generally, there is but little difficulty, when the child is properly secured, in obtaining a satisfactory view of the whole surface of the conjunctiva. The only exception to this statement is, where the palpebræ are, as is sometimes the case, enormously swollen, and the fissure between them is very small, as in cases of purulent ophthalmia, in which complaint, indeed, it is sometimes absolutely impossible to obtain an examination of anything more than the conjunctival surface of the palpebræ, the tendency to eversion of the lids rendering this an easy task, however difficult it may be to expose the conjunctiva of the globe and the cornea.

In order that it may be known when the conjunctival membrane is in a diseased condition, it is of course requisite that the practitioner should have become previously familiar with its appearance in health. In the healthy state, the conjunctiva of the globe is a very delicate, pellucid, almost colourless, and scarcely perceptible membrane. The shining white of the sclerotica alone is presented to the view of the observer, except at *the inner and outer canthus*, and at the superior and inferior parts of the

globe, where a few straggling vessels are discernible in the substance of the conjunctiva.

The portion of conjunctiva lining the lower eye-lid is more dense, and, being possessed of a higher degree of vascularity, is of a bright red tinge, and is scarcely transparent, except where it is less injected, as towards the inner canthus, and at the point where it is reflected upon the sclerótica.

The conjunctiva of the superior eye-lid is much less vascular than that of the inferior. It partakes altogether more of the character of the conjunctiva of the globe; being, like it, very thin, transparent, having very few vessels, and consequently being almost colourless.

The deviations from the healthy condition of the conjunctiva are both numerous and varied, but are chiefly dependent upon derangement of its vascular action, or inflammation. That they are many of them of great importance will sufficiently appear from the descriptions which follow.

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## SECTION I.

### SIMPLE OPHTHALMIA, OR CONJUNCTIVITIS.

Inflammation, when confined to the conjunctival membrane, and arising from the slighter causes of irritation, and when free from the constitutional and other peculiarities we shall hereafter have to consider, is usually a very simple affection, particularly if the conjunctiva of the cornea do not participate in it. Hence, it seldom requires very active treatment, and is never productive of much mischief, although it may be a source of great distress and inconvenience to the patient. But, if it should not be checked, there is no telling how soon the disease may extend to the cornea or some other important texture, and thus vision become seriously impaired.

*Symptoms.*—The leading symptoms of this affection are increased vascularity of the membrane; lacrymation, or an unusual flow of tears; intolerance of, or morbid sensibility to, light; and a painful or uneasy sensation upon the surface of the eye.

It may here be stated that the symptoms of disease are, by systematic writers, formally divided into two classes, 1st, The *objective* or anatomical, which refer to the appearances of the diseased part; and 2ndly, The *subjective* or physiological, which apply merely to the alteration or disturbance of the functions of the part. Thus, the objective symptoms



of conjunctivitis are such as relate specially to the altered condition of the membrane,—the increased vascularity and its consequences ; whereas the subjective are merely disturbances of function, as lacrymation and intolerance of light. The objective symptoms are the most important and the first to merit the attention of the practitioner.

*Increased Vascularity* is a constant and an obvious symptom. In the healthy state, as before observed, the conjunctiva scarcely exhibits any appearance of vessels, not more than three or four being usually apparent upon its ocular surface ; but, if it become inflamed, then the vessels are infinitely multiplied and strikingly distinct. This condition exists in more or less intensity, from the slight redness, popularly termed *blood-shot*, up to that extremely injected and distended state of the vessels called *chemosis*. In chemosis, the conjunctiva is much thickened from the great increase in the number and size of its vessels, as well as from serous effusion in its texture. Chemosis, however, is seldom observed in simple ophthalmia. Sometimes there is a partial appearance of the chemotic kind, arising from an effusion of a dark red jelly-like fluid, which is termed *ecchymosis*.

*Diagnostic symptoms*.—The *conjunctival vessels* are known by their being somewhat tortuous in their direction, superficial, generally moveable with the loose conjunctiva, and of a bright red colour. By these marks we satisfy ourselves that the vessels are those of the conjunctiva in contradistinction to those which traverse the *sclerotica* ; the latter being much less tortuous, indeed nearly straight as they approach the circumference of the cornea, seated under the conjunctiva, and therefore not moveable with it, and having a pink colour. These points of distinction should be permanently fixed in the mind, since a proper discrimination of them will enable us to satisfy ourselves as to the seat of the inflammation, that is, whether it be simply the conjunctival membrane or the sclerotica, a discrimination upon which the kind of treatment to be adopted materially depends.

*Lacrymation*, though an usual, is not an invariable attendant upon conjunctival inflammation. The irritation on the external surface is communicated by the sentient nerves, to the lacrymal gland, and hence the increased flow of tears, a discharge which is presumed to be serviceable in relieving the uneasiness attendant upon this affection, and is no doubt of use in washing away minute substances that are apt to lodge upon the conjunctiva, and produce the irritation in question. In some instances,

the lacrymal fluid is not only greater in quantity, but has its temperature, or other qualities, so far modified, that it irritates the outer surface of the eye-lids, and the skin of the cheek, over which it frequently runs, owing to the puncta not being able to carry it away wholly as it is secreted.

*Intolerance of light* attends the great majority of cases of conjunctival inflammation, though it cannot be said that there is always an exact proportion between the intensity of this phenomenon and that of the inflammation, for, often in acute conjunctivitis, there is but little intolerance of light; and, on the other hand, there is sometimes great intolerance when the conjunctivitis is but trivial.

*The painful or uneasy sensation* experienced from conjunctival inflammation may be compared to that produced by the presence of a particle of dirt, accidentally introduced between the conjunctival surfaces. When free from disease, these surfaces are accurately adjusted, and glide smoothly and freely one over the other; but conjunctival inflammation existing, the vessels are enlarged, and distended with red blood, and project from them, and by the friction attendant upon the winking motions of the lids, cause irritation, and the sensation of the presence of a foreign body.

*Subsidiary Symptoms.*—The symptoms attendant upon ophthalmia are not always presented exclusively by the eye itself. In the slighter examples, such, indeed, is often the case; but in those more aggravated, the irritation is communicated, doubtless, through the agency of the nervous system, to the contiguous and surrounding structures; hence the head-ache and circum-orbital pain sometimes complained of; and sometimes the whole system sympathises, as is shown by the presence of pyrexia, and other symptoms of disorder.

*Causes.*—The causes which induce simple conjunctival inflammation are not always apparent. Sometimes we are able to trace it to exposure to wet, or a draught of cold air, great heat, strong light, mechanical irritation from foreign substances, irritating vapours, and the like. In some persons, too, there is such a constitutional predisposition present, that exposure to cold, intoxication, or disorder of the digestive organs, is almost certain to excite an attack of the disease.

*Treatment.*—The treatment of conjunctival inflammation must necessarily vary according to the greater or less severity and duration of the attack, and the constitution, age, and other circumstances of the patient.

In ordinary cases, the disease will yield to rather mild treatment. Abstinence from strong food or stimulating fluids, with the occasional administration of a brisk purgative, such as calomel and colocynth, or the compound senna mixture, will form the chief internal treatment. Local applications are sometimes serviceable, but it is not always easy to say whether these should be warm or cold; the decision may usually be left to the feelings of the patient. If the patient be of a robust constitution and the disease of a rather acute character, attended with a sense of heat externally, it is likely that cold applications will be preferred. On the contrary, if the patient be of a delicate and irritable constitution, warm applications will probably afford greater relief. Cold applications are to be used simply upon the external surface of the palpebræ. A thin fold of muslin, saturated with cold water, spirit and water, or a solution of superacetate of lead, in distilled vinegar sufficiently diluted, will be suitable. Warm applications are to be used as fomentations also to the outer surface of the palpebræ: of these, warm water, common tea, an opopony decoction, are probably the best.\*

\* The following Formulæ may be serviceable to the student or junior practitioner. Others will be given as occasion may seem to require in the progress of the work.

## ℞. No. 1.

Plumbi acetatis gr. xij.

Acet. destillat.

Aq. rosæ,

— destillat. ʒā ʒij.

Misce.

## ℞. No. 2.

Liq. plumbi sub-acet. ʒss.

Tinct. opii ʒij.

Aq. rosæ,

— destill. ʒā. ʒiij.

Misce.

In prescribing a collyrium containing any of the salts of lead, a prohibitive should be given against its being allowed to come into contact with the conjunctiva or cornea, as if there be any abrasion of the surface of the cornea there is a danger of the salt being deposited within it. See observations on this subject in sect. 6. chap. ii. on opacity of the cornea.

## ℞. No. 3.

Aceti destillati,

Spirit. vini rectific. ʒā ʒj.

Aq. destillat. ʒiv.

Misce.

## ℞. No. 5.

Liq. ammon. acet. ʒij.

Tinct. opii ʒss.

Aq. destill. ʒvss.

Misce.

## ℞. No. 4.

Decoct. papaveris. ʒvj.

Tinct. opii ʒij.

Misce.

## ℞. No. 6.

Tinct. opii. ʒij.

Mist. camph.

Aq. rosæ, ʒā ʒiij.

Misce.†

It occasionally happens, however, that the inflammatory action is so acute, especially in persons of a robust and vigorous constitution, that it may be necessary to resort to blood-letting. The mode in which blood should be abstracted will depend upon the intensity of the inflammatory action, and the probability or not of its extension to the more important parts of the eye.

It may be laid down as a general rule, that venesection is seldom required, except the system be sympathetically affected, and the pulse be much excited, the tongue furred, and there be throbbing pain in the head. On the contrary, when no such general excitement exists, even though the inflammation be of an active character, and threaten to implicate the more important textures, cupping on the temple or at the nape of the neck, followed by the application of leeches to the palpebræ, will prove the most judicious practice.

By way of caution, it cannot be too forcibly impressed upon the mind, that, although conjunctivitis is ordinarily a trifling affection, yet sometimes it is but the forerunner of another of a much more serious description: the surgeon should, therefore, always be on the alert to detect any extension of the disease to the deeper-seated and more important parts of the organ, and adapt the activity of his treatment to the urgency of the symptoms.

CASE.—Mr. W., a stout, plethoric man, about 40 years of age, consulted me for an affection of his right eye, which had existed several days. On examination, the conjunctiva was observed to be excessively vascular, the vessels having a bright red tinge, and being quite superficial. The eye was watery, and intolerant of light, and he complained of a pricking sensation in it, and of a slight head-ache; vision but little impaired, and there was no other obvious mark of disease, the cornea not being at all affected, the pupil not more contracted than that of the other eye, and the iris possessing its usual brilliancy. The sclerotica could not be seen, in consequence of the highly injected condition of the vessels of the conjunctiva. His general health was unimpaired. From the intensity of the conjunctival inflammation, I was apprehensive that the cornea, or some of the deeper-seated textures, would, sooner or later, become implicated. Acting under this impression, I directed him to be cupped on the temple to twelve ounces, to use a poppy fomentation to the palpebræ, to be freely purged with calomel and the compound senna mixture, and to be restricted to a low

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† The three first of these Formulæ are to be used as evaporating lotions; whilst the others should be employed as fomentations.

diet. Two days afterwards, the conjunctival inflammation was somewhat abated, and the cornea remained unaffected; but the iris presented a slight dimness on its surface, and a streak of lymph stretched across the pupil, which was now more contracted than before, but perfectly circular. Vision was much obscured. I then ordered a dozen leeches to be applied upon the eyelids, the extract of belladonna to be smeared upon the eyebrow and lids every night at-bed time, and four grains of calomel to be taken every four hours. At the end of the next two days, there was no perceptible change, except that the quantity of lymph in the pupil had rather increased. The belladonna had not caused any dilatation of the pupil, and vision was nearly gone. The cupping was ordered to be repeated, the belladonna to be kept constantly applied, and the calomel to be steadily continued. At his next visit, three days afterwards, the mouth had become decidedly affected, and a marked improvement in all the symptoms was observable; the lymph appeared to be absorbing, the pupil somewhat dilated, and vision partially restored. At first, it has been remarked, the vessels of the sclerotica could not be seen, since they were completely concealed by the extreme vascularity of the conjunctiva. So soon, however, as the latter became much diminished, the former were distinctly visible. In the course of the next few days, the pupil became considerably dilated, the lymph completely absorbed, the vascularity both of the conjunctiva and sclerotica nearly disappeared, and vision was rendered as perfect as before.

In addition to what has already been said on the subject of blood-letting, I may observe, that in the instance of acute conjunctivitis, brought on by the infliction of any injury to the eye of an individual in the possession of full health, or of a plethoric tendency, the practice of either general or local blood-letting, according to the intensity of the affection, will be decidedly proper, and generally affords considerable and speedy relief.

CASE.—Mrs. B., a stout, portly person, about 50 years of age, usually enjoying excellent health, whilst walking out, got a particle of dirt blown upon the eye, which occasioned her excessive pain for some time. The pain, however, somewhat abated after the expulsion of the foreign body. The next day her sufferings returned with increased force, and she concluded that there must still be something to keep up the irritation. She then applied to me. On examination, there was nothing discoverable but the existence of rather acute conjunctival inflammation. Half a dozen leeches were ordered to be applied to the palpebræ, these afterwards to be frequently fomented with warm water, and some mild purgative medicine was also prescribed. On the next day, the symptoms were much mitigated, and at the end of three days more, the irritation had completely subsided.

*If the attack of conjunctivitis be less violent and somewhat more pro-*

tracted, constituting the *sub-acute* form of the disease, it is scarcely possible that blood-letting can be requisite. It is in instances of this kind that scarification of the conjunctival vessels has been usually recommended. This is a proceeding which I never adopt, the quantity of blood abstracted by this operation being usually so inconsiderable as to render it, as a method of blood-letting, perfectly inefficacious; and it is difficult to see on what other principle it can be serviceable. Besides scarification, counter-irritation is usually recommended; and I do not deny that in some instances the application of a blister to the temple, or to the nape of the neck, may be useful. If the disease, however, be much protracted, this is not the treatment I should recommend, but rather one, the details of which I shall give in the following section.

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## SECTION II.

### CHRONIC OPHTHALMIA.

In many instances conjunctival inflammation comes on insidiously, is very slow in its progress, and never attains the severity of the acute form of the disease described in the preceding section. In others it may be very active for a short period at first, and then gradually assume a chronic character; and this more particularly if it be not, in the beginning, efficiently treated. Such are instances of chronic ophthalmia, in which the conjunctival inflammation may be protracted through several weeks, or even months.

*Peculiarities.*—In chronic ophthalmia the conjunctival vessels appear to be distended and relaxed, and not to be possessed of their natural amount of tonic power. There is usually less irritability about the eye than in the acute variety, although it is often very far from being absent. The eye is watery on exposure to light, or to the cold air; weak, as the patient expresses it. It is fortunate in those cases of chronic ophthalmia which are consequent on the acute form of the disease, if the conjunctiva of the cornea have escaped, for it is very common to find that more or less opacity of this texture has been produced; and, should the opacity be seated near the centre of the cornea, there must almost of necessity be some interference with vision.

It is a remarkable fact that the conjunctiva of the lower lid is much more frequently the seat of chronic inflammation than that of the upper. This may probably be accounted for from its greater supply of blood-vessels, for, as before mentioned, in the healthy state they are much more numerous in this than in any other portion of the conjunctiva. When the chronic inflammatory condition has existed for some time, this portion of the membrane assumes a different aspect. It becomes one entire mass of vessels, and, in some instances, presents a smooth, velvety, and in others an uneven and irregular appearance. Very frequently, also, the redness is peculiarly pale, more particularly in delicate persons.

*Treatment.*—The object to be kept in view in treating a case of this description, is to restore the weakened vessels from their relaxed and enlarged condition to their normal tone and calibre. How is this object best accomplished? Assuredly not by the use of leeches, blisters, and purgatives. At all events, we shall but rarely succeed by the employment of these means. I have met with numerous tedious and protracted cases in which cupping, leeching, scarifying, blistering, mercurialising, and purging, have been fruitlessly had recourse to throughout many weeks and months. Most of these cases have soon got well under what I conceive to be a much better mode of treatment.

*Local Stimulants.*—In the slighter cases of chronic ophthalmia, I have often known the employment of the sulphate of zinc collyrium, in the proportion of three to four grains of the sulphate to an ounce of water, afford a sufficient stimulus to the relaxed conjunctival vessels. In the more severe and protracted cases, a more effectual treatment is to apply either the sulphate of copper or nitrate of silver in substance, to the conjunctival surface of the lower lid. In addition to this application, the patient may be directed to use, at intervals, a collyrium of some stimulating kind, such as that previously mentioned, or a solution of the sulphate of copper, in the proportion of two or three grains of the sulphate to the ounce of water. The zinc ointment in milder cases, and the red precipitate in those which are more severe, should also be recommended to be applied in the evening, more particularly if the tarsal margins are apt to become agglutinated after sleep, as they sometimes are when the glandular secretion is deprived.

*Nitrate of Silver.*—The application of the nitrate of silver in substance is easily made, and is by far the most efficacious remedy I am acquainted

with for chronic ophthalmia. Expose the conjunctival surface of the inferior eyelid, by manipulating as before directed, and then draw the nitrate of silver, pointed like a pencil, *lightly* across it. The portion of conjunctiva touched immediately becomes white, from the tears acting upon the nitrate of silver and producing, it is said, a muriate of silver. The application is always productive of a great increase in the lacrymal discharge, and is very generally followed by a severe smarting or burning sensation, which usually continues from half an hour to three or four hours. At the expiration of that period, the uneasiness subsides, and a decided improvement is soon perceptible in the condition of the eye.

*Sulphate of Copper.*—The application of the sulphate of copper in substance, is also frequently productive of beneficial results; and, although much milder in its action than nitrate of silver, this remedy will generally be sufficiently powerful in the slighter cases of chronic conjunctivitis. It is to be applied in the same manner as the nitrate of silver, with this difference, that it should be kept in contact with the conjunctival membrane *for a few seconds*, which the patient will usually bear without much complaining. A small portion of the sulphate appears to be dissolved by the lacrymal fluid, as this fluid is generally perceived to be tinged of a blue colour, after the use of this substance.

*Mode of applying local remedies.*—It is rarely necessary to apply stimulants to the conjunctiva of the superior eyelid, because, in simple conjunctival inflammation, we seldom find that it participates to any considerable extent in the general inflammatory condition of the membrane; and it is the less necessary, as the effect produced by their application to the lower one becomes diffused over the whole conjunctival surface by the winking motions. Indeed, the conjunctiva of the lower lid ought to be the recipient of all the local stimulants employed in chronic ophthalmia. If we prescribe a stimulating lotion or ointment, but little good can be expected to result from its use if this be not brought into actual contact with it; and, as we know how seldom applications of this kind are properly used by patients, there is the greater necessity for the surgeon himself frequently to apply something on which he can depend for producing the proper impression. If the application of stimulant fluids be entrusted to patients or their attendants, strict injunctions should be given as to their efficient use. The lower eyelid ought to be depressed and everted, and a camel-hair pencil saturated with the fluid should then be drawn across its



conjunctival surface. If an ointment should be recommended, it should be first melted, and then applied in the same manner. In milder cases the fluid may be dropped upon the conjunctiva oculi, or the ointment smeared upon the tarsal margins, but neither of these is so effective a mean as the former.

*Objections to stimulant treatment.*—Various objections have been urged against the use of stimulants of every kind, in the treatment of the affection before us; but these I consider to be untenable. By some, for example, it is thought that, where there is already inflammation, such applications must necessarily add to the mischief. It is a well-known fact, however, that substances which, when applied to the healthy structures, cause inflammation, will, when applied to the same structures in a state of inflammation, often remove the inflammatory state. I need but allude to the employment of nitrate of silver in the treatment of erysipelas, of turpentine in that of burns, and the like.

Many writers of established reputation contend that general treatment will effect every thing that is requisite in ophthalmic practice; that we have nothing to do but to bleed, and purge, and mercurialise our patients, and that thus we shall never fail to remedy all the inflammatory conditions observed in the organ of vision. If such a representation were correct, which it is very far from being, still, who would not prefer the more rapid more efficacious treatment by stimulants to the slow, disagreeable, and debilitating means, which are comprised in the term “antiphlogistic treatment?” What practitioner can be justified in recommending a patient to be bled, leeches, nauseated, and mercurialised, for a case of simple conjunctivitis, when it is certain that a few applications of nitrate of silver or sulphate of copper are all that is required to remove the malady, and that both more expeditiously and more completely? And yet, strange to say, there are authors who strenuously advise the antiphlogistic mode of treatment in this form of disease. Nay, they even declaim, too, against those who recommend the use of stimulants; but they take good care to shut their eyes to the impropriety of needlessly subjecting their patients (often delicate and irritable) to all the evil consequences of profuse blood-letting, salivation, and other similar means.

I have now mentioned the principal local remedies which are required for the successful treatment of chronic conjunctivitis. But if we turn over the pages of authors who have written on ophthalmic surgery, we shall

find in them a great number of formulæ for the preparation of various eye-lotions, drops, and ointments. A very large proportion of these formulæ, I conceive to be perfectly useless, and some of them even ridiculous, from the substances prescribed in them being either inert or incompatible in their chemical or physiological properties, or in both. All the really valuable applications are few in number, and may be divided into two kinds, viz. stimulants and sedatives. In the former class may be placed more particularly the nitrate of silver and sulphate of copper, either in substance, solution, or as ointment; alum, sulphate of zinc, and oxymuriate of mercury in solution; and the red precipitate, zinc, and citrine ointments. It would be difficult, indeed, to give any good reason why these should be preferred to many other stimulating substances that might be mentioned. All that can be said is, that these, on the whole, are as suitable as any others, and have the advantage of having been sufficiently tried, and found useful, and may therefore be depended upon.\*

Of sedative applications, those chiefly in use are warm water, decoction of poppies, the solution of superacetate of lead, infusions of belladonna, opium, and hyoscyamus. Sedative applications should be applied merely

\* One or more of the following formulæ may be adopted according to the peculiarities of the individual case.

COLLYRIA.

℞. Argenti nitratis gr. vi.

Aq. destillat. ℥vi.

Misce.

℞. Cupri sulphatis gr. xij.

Aq. rosæ ℥ij.<sup>1</sup>

— destillat. ℥iv.

Misce.

℞. Hydrarg. bichlorid. gr. iss.

Tinct. opii. ℥ii.

Aq. rosæ. ℥viiij.

Misce.

℞. Zinci sulphatis gr. xij.

Tinct. opii. ℥ii.

Mist. camphoræ ℥viiij.

Misce.

UNGUENTA.

℞. Argenti nitratis gr. iv.

Liq. plumbi subacetatis ℥ss.

Adipis. ℥ss.

Misce.

℞. Hydrarg. nitr. oxid. ℥j.

Cerat. cetacei ℥ss.

Misce.

℞. Cupri sulphatis ℥ss.

Camphoræ gr. v.

Cerat. cetacei ℥ss.

Misce.

℞. Zinci oxid. ℥i.

— sulphatis, gr. v.

Cerat. cetacei ℥ss.

Misce.

to the external surface of the palpebræ, whilst stimulants are useless except when brought into contact with the conjunctiva. Sometimes sedatives may be judiciously combined with stimulants, particularly in the more active forms of conjunctivitis, or where the pain or uneasiness is very considerable. Thus, after having applied the nitrate of silver in substance, I frequently recommend the use of one or other of the before-mentioned sedatives.

Having described chronic conjunctivitis, and pointed out the means ordinarily had recourse to in treating it, and those upon which I myself more particularly depend, it may not be without its use to give the following cases in illustration.

CASE 1.—Mr. W., a young man, an attorney's clerk, otherwise enjoying very good health, when I first saw him had been occasionally subject to attacks of inflammation of the left eye, during four or five years, the principal part of which time he had been residing in London, and under the care of several eminent ophthalmic surgeons. The last year he had resided in Manchester, and had been treated by one or two respectable surgeons by means of issues, and the ordinary antiphlogistic remedies. Some liquid substances had been likewise repeatedly dropped upon the eye, all without benefit; the inflammation up to the time of his consulting me continued, and vision gradually failed. At that period, he could not bear to expose the eye to light, and wore a shade over it, and described it as being weak and watery, but not painful. The conjunctiva of the lower lid and of the inferior portion of the eye-ball was much injected, the vessels large, and rather numerous. The sclerotica and iris were free from disease; but the lower portion of the cornea was dotted over with opaque spots, and there was a slight general nebulous appearance. Vision was so much impaired, that he was unable to read with the diseased eye. I drew down the margin of the lower lid, and then passed the nitrate of silver pencil lightly across its conjunctival surface. This operation was repeated three or four times, at intervals of three days; and afterwards the sulphate of copper was substituted for the nitrate of silver, and applied at the same intervals. He was also recommended to use a solution of sulphate of zinc, as a collyrium, frequently during the day, and the red precipitate ointment at night; and to take a dose of calomel and colocynth in the form of a pill, every second or third night. In about three weeks from the commencement of this treatment, the vascularity of the conjunctiva had disappeared, and the opacity of the cornea was nearly removed: he had also thrown away his shade, and was able to read with this eye with the greatest ease.

CASE 2.—Miss O., æt. 24, of a pale complexion, and rather delicate constitution, at the time of consulting me had been frequently the subject of ophthalmia, and at that period had an issue, which for three years had been kept open with a view of relieving her eyes; and she thought, while she had had the issue, that

they had not been so liable to inflammation as previously. When I first saw her, the inflammatory attack had existed three weeks, during which period she had not been able to expose her eyes to the light with any degree of freedom. She was in the habit at these times of wearing blue spectacle glasses, shaded with dark crape at the sides, which afforded much relief. The conjunctiva of both eyes was much injected, and there was a slight opacity of the cornea of the right one, the vision of which was impaired. Having everted the lower lid of each eye, the pencil of nitrate of silver was carried lightly across the conjunctival surface. She was recommended to use the zinc collyrium, and the red precipitate ointment, as in the former case, and to take a dose of sulphate of magnesia every two or three days. In three days time the vascularity was very much diminished, the intolerance of light nearly gone, and she was again able to use her eyes with comfort. As she had so much improved in this brief space, I deemed it unnecessary to repeat the application of the nitrate of silver, but desired her to continue the use of the other remedies. At her next visit, three days subsequently, she was nearly well, all signs of inflammation having disappeared. This lady expressed herself highly gratified at the rapid improvement in her case, and contrasted it, with pleasing satisfaction to herself, with the slow improvement she experienced from the opposite treatment always before adopted, viz. leeching, blistering, &c.

*Ulceration from Nitrate of Silver.*—There is one effect which I have sometimes observed to result from the use of nitrate of silver, which it is proper to mention before dismissing the subject of the local treatment of chronic ophthalmia. I mean superficial ulceration of the conjunctiva. In the vast majority of cases, this ulceration is followed by no disagreeable consequences,—it is a matter of no importance; indeed, in some instances, it is probable that it may be rather beneficial than the contrary. Yet it occasionally happens that slight inversion of the lid results from it.

It has fallen to my lot to witness some hundreds of cases of chronic ophthalmia, in private and hospital practice, in which the nitrate of silver in substance has been employed; and I do not remember to have seen more than two or three cases in which inversion of the lid occurred, and this in all of them was so inconsiderable as to admit of being easily remedied. This, as far as I know, is the only solid objection that can be raised against its use. I mention this fact, because I am desirous that no mistakes with respect to its real effects should be made, and to show the necessity of some caution in its use. The cases I allude to I regard merely as exceptions, and very rare ones, to the general rule, that nitrate of silver, when cautiously and properly applied, is the most valuable agent we can employ in the treatment of chronic conjunctivitis.

With respect to the cases just alluded to, I would further remark that the ulceration and consequent inversion were not results of the long continued use of the nitrate, nor were the cases themselves of a very severe character: on the contrary, the nitrate had not been used more than once or twice. Indeed, it is not improbable that in these cases there was an original tendency to inversion of the lid, as is frequently noticed in elderly persons, in whom the integuments are much relaxed, and who have been the subjects of protracted ophthalmia.

CASE.—M. A., *ætat.* 25, a delicate young woman, whose general health was somewhat impaired, applied to me on account of the following disease of the right eye, which had existed for several weeks, and had been gradually getting worse. The conjunctiva, both palpebral and ocular, was very vascular; there was also an opacity on the temporal side of the cornea, with superficial ulceration, some intolerance of light, and watery discharge from the surface of the eye; vision was somewhat obscured; there was no other morbid appearance. I drew the nitrate of silver across the conjunctiva of the inferior eye-lid, in the usual manner, and directed her to use the solution of zinc as a collyrium, and to take a purgative occasionally. When I again saw her, five or six days afterwards, I found the eye looking decidedly better, and the symptoms were all alleviated; but I also found that there was slight ulceration of the conjunctival surface, and that the tarsal margin had become somewhat inverted, several of the cilia being nearly in contact with the globe of the eye. I immediately drew a pointed stick of pure potass along the outer surface, and just below the ciliary margin of the lid, from one side to the other, so as to produce a narrow lengthened eschar. The other remedies were ordered to be continued, with the exception of the nitrate of silver. At her next visit, seven days afterwards, the eschar produced by the potass had separated, and the ulcer consequent thereon had healed, a slight contraction of the integument had resulted, and the inversion was completely removed. There was scarcely any mark visible where the potass had been applied. At the end of another week the eye was nearly well, with the exception of the opacity of the cornea.

*General Treatment.*—I have thus far said but little on the subject of internal treatment, because in the generality of cases of chronic ophthalmia, I am satisfied that it is principally to local treatment that we are to look for the means of cure. At the same time I am very far from stating that internal treatment may be neglected; on the contrary, I am always careful to inculcate the necessity of strict attention to the state of the alimentary canal, and if disorder exist there, the immediate correction of it by *such means* as seem most suitable.

Moreover, there are cases of conjunctival inflammation that have their origin directly in derangement of the digestive or other remote organs. In these, the inflammation is apt to return whenever the individual is out of health, and of course can only be regarded as a sympathetic affection. In such cases, local treatment will not be so serviceable; for a cure, we must rather look to the improvement of the general health.

CASE.—Mrs. W., æt. 45, has had an affection of her left eye ever since she was a child, which came on subsequently to an attack of measles. There is a large leucomatous opacity of the cornea at its lower and central points, and a small opaque spot on the capsule of the lens, so that vision is very imperfect. This eye has been very frequently the subject of conjunctival inflammation, when it has been painful, watery, and intolerant of light; and this state has almost invariably occurred when she has been troubled with indigestion. I have always found local applications of no use; the only means of relief have been such as have tended to restore the healthy functions of the digestive organs, viz., aperients and tonics, and after this has been effected the ocular complaint has subsided.

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### SECTION III.

#### CATARRHAL OPHTHALMIA, OR CONJUNCTIVITIS MUCOSA.

It may be necessary here to remark that some writers contend that there is but one species of conjunctivitis, viz., that which we have already described, and that the different varieties we still have to treat of are but modifications of this, and depend upon the constitutional peculiarities of individuals. Whether this be a true account of the matter or otherwise, still the varieties present characters so very different, that it is necessary to study them in detail.

*Symptoms.*—Catarrhal ophthalmia in point of importance holds an intermediate position between simple conjunctivitis and purulent ophthalmia, being generally more severe than the former, but less so than the latter affection. Its symptoms are therefore of a mixed character. The vascularity is usually more intense than in simple conjunctivitis; it more frequently amounts to chemosis; the mucous follicles are often enlarged and elevated, and give rise to an appearance of roughness on the conjunctival surface of the palpebræ; and there is a considerable discharge, not merely of tears, but of a thick mucus with portions of a flaky

substance intermixed with it. These are the distinctive characteristics of catarrhal ophthalmia.

But, besides these, there are other symptoms, viz., pain or uneasiness and intolerance of light, which are common to it and simple ophthalmia, though the intolerance of light is often much less than in the latter affection.

The thick mucous discharge is apt to lodge about the margins of the eye-lids and amongst the cilia, and cause them to adhere to each other; and the eye-lids also frequently participate in the inflammatory action, the skin being reddened and their entire substance swollen.

In some instances the catarrhal affection extends to the mucous membrane of the nostrils and air passages, and is attended with sneezing, cough, &c. and there are often head-ache and other febrile symptoms present.

This affection generally attacks both eyes, though at first it sometimes remains for a short while confined to one; whereas, in simple ophthalmia it is often confined to one throughout.

*Causes.*—Catarrhal ophthalmia appears to originate in some peculiar condition of the atmosphere, similar to that which produces influenza. Exposure to an easterly wind or to the combined influence of wet and cold, sleeping in a draught of air from a door or window being left open, and similar causes, are also supposed to originate this variety of conjunctivitis.

*Epidemic Character.*—This disease frequently attacks large numbers of persons at once, so that it is very common to find it affecting an entire family, particularly the children. Sometimes, also, it has been known to attack whole regiments of soldiers; and, not unfrequently, it spreads through almost every family in villages and even in large towns. The first is a matter of common observation, and the latter are well authenticated historical facts. In these instances, the affection is most probably propagated chiefly by atmospheric influence; though infection, as supposed by some, may also play its part.

It is this epidemic character that is one of the chief peculiarities of catarrhal ophthalmia. Now, when we find that there is conjunctival inflammation, attended with the distinctive marks I have stated, affecting two, three, or more children in a family, or more persons in a neighbourhood, I ask if this is not to be regarded as a very different affection from

simple conjunctivitis? Does the latter ever take on an epidemic character? Can any one who denies the existence of catarrhal ophthalmia, by inflicting an injury upon the eyes of an individual, bring on an attack of this variety of conjunctival inflammation, and thus originate an epidemic disease that shall extend itself through a whole neighbourhood or an entire city?

I am quite prepared to admit that sometimes, in conjunctivitis occurring after an injury, there will be some resemblance in the symptoms to those of mild catarrhal ophthalmia, more particularly as respects the mucous character of the discharge. But we often find one disease presenting symptoms analogous to those of another to which it is nearly allied. We may readily conceive, too, that an individual who has had the eye injured in any manner, may have the resulting inflammation so far modified by the peculiar condition of the atmosphere at the time, as to give to it much of the appearance observed in catarrhal ophthalmia.

*Treatment.*—The treatment of the catarrhal variety of ophthalmia does not materially differ from that of simple conjunctivitis. In the ordinary run of cases, the symptoms arise, proceed, and subside with much regularity and without being productive of any serious consequence, and therefore demand but little attention on the part of the surgeon. The treatment usually recommended is, at first, the application of leeches, an evaporating lotion, a blister behind the ear, and the internal administration of purgatives. Afterwards, when the more active symptoms have subsided, then a stimulating lotion, such as a solution of sulphate of zinc, is substituted for the evaporating lotion. This is the plan commonly followed; and, in my opinion, we may just as well leave the disease to proceed in its usual course, for I do not conceive that such practice is at all likely to check its progress.

If the attack be at all severe, or have become somewhat protracted, so as to seem to call for interference, I have found that the best practice is to resort at once to the use of stimulants. Prof. Beer, Dr. Mackenzie, and others, recommend a solution of nitrate of silver, in the proportion of four grains of the nitrate to an ounce of distilled water, to be dropped upon the conjunctival surface of the eye. If this be properly applied, no doubt it will be productive of benefit. I am in the habit of preferring the application of the nitrate of silver, or of the sulphate of copper, in substance. I have often noticed that the use of a solution of nitrate of silver has either



not been sufficiently powerful to produce any beneficial effect, or that it has rather increased than allayed the irritation ; and that, in either case, on the application of the same remedy in substance, an immediate and decided improvement has resulted. I mention this as a general remark applicable to the use of this substance, not only in this but also in other forms of ophthalmia.

In mild cases, if called upon to interfere, a single application of the nitrate of silver will generally be sufficient, or the sulphate of copper may be substituted. In those which are more severe, the former should be preferred, and it will be necessary to repeat it at intervals of three or four days.

The patient may also be directed to use a solution of the sulphate of zinc, or of the sulphate of copper : if these be used in the manner I have before pointed out, they may be decidedly useful, otherwise they may as well be omitted. The application of the zinc or red precipitate ointment to the ciliary margins of the lids occasionally, may also be serviceable. [See Formulæ, p. 17.] Attention should likewise be paid to the condition of the general system.

By adopting the stimulating practice, I am satisfied that we can materially lessen the duration of the disease in question, and are certain to prevent its extension to the cornea, which is otherwise apt to become vascular, ulcerated, or opaque. Indeed, the more aggravated cases are frequently so intense as to border very closely upon the disease next to be considered, viz., purulent ophthalmia.

CASES.—An itinerant musician and his wife, both young and healthy looking persons, were attacked nearly at the same time with all the symptoms of catarrhal ophthalmia in both eyes. In the husband, the disease was comparatively slight ; there was but little external affection of the lids, but the conjunctiva was very vascular, and there was a good deal of watery and mucous discharge ; he had but little intolerance of light and not much uneasiness. His wife had the disease in a more aggravated form ; the eye-lids were considerably swollen and very red, the margins being agglutinated with the mucous discharge. The conjunctiva was intensely vascular, and in a state of chemosis, and the portion lining the lids, particularly the lower, had a rough granular appearance. Both tears and mucus escaped in great quantity, but there was nothing of a purulent character observable. She had great intolerance of light, and complained of much uneasiness in both eyes, as well as of some pain in the orbital region. When they first presented themselves, the disease had only existed three or four days. Both were treated on the stimulant plan ; the man had the sulphate of copper, the woman

the nitrate of silver applied to the conjunctival surface of each inferior lid ; and, in addition, they were directed to use the zinc collyrium and the red precipitate ointment, and to take a purgative occasionally ; the former speedily recovered ; the latter had the nitrate of silver applied every three or four days, and was quite well in about three weeks from the commencement of the attack, without the cornea having at all participated.

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#### SECTION IV.

##### PURULENT OPHTHALMIA ; OR, CONJUNCTIVITIS PURIFORMIS.

The next variety of conjunctival inflammation that demands notice is, conjunctivitis puriformis, or purulent ophthalmia, so named from the appearance of the discharge poured out from the conjunctival surfaces. This variety is also frequently termed *Egyptian* ophthalmia, and sometimes *contagious* ophthalmia. The former of these appellations has been assigned to it on account of its presumed origin ; the latter, from the mode in which it is supposed to be communicated.

Of conjunctival inflammation, there is no form so severe or dangerous as that under consideration. Conjunctival inflammation in this form is, indeed, one of the most important of all the affections of the eye ; and it is even probable that a greater number of individuals are deprived of vision from this disease than from any other cause. Hence purulent ophthalmia has justly excited, particularly of late years, the earnest attention of surgical practitioners ; and to no class of the profession are we more indebted for information concerning its nature, and the means of treating it, than to the intelligent and highly respectable class attached to the military service of the country.

There are many affections, as well of the eye as of other organs, which may be safely trusted to the unaided efforts of nature. Purulent ophthalmia, however, is not one of them ; for if there be a disease which more than another requires the vigilant attention of the ophthalmic surgeon, it is this.

In presenting my remarks on purulent ophthalmia, I shall imitate the example set by authors in general, of first treating of the ordinary purulent ophthalmia of adults ; next of gonorrhoeal ophthalmia ; and, lastly, of the purulent ophthalmia of infants ; and I shall do so, not because there is any material difference in the nature or treatment of

these several varieties, but because there are some peculiarities connected with them, which, by adhering to this arrangement, may be more appropriately pointed out.

#### PURULENT OPHTHALMIA IN THE ADULT.

*Symptoms.*—The symptoms which indicate its existence are similar to those of catarrhal ophthalmia, though of a much more intense and severe description. The two affections have been regarded, by some writers, as modifications of the same disease; and, on a first view indeed, the distinctions between a very severe case of catarrhal and a mild case of purulent ophthalmia are not very strongly marked.

The most striking symptom of this variety of ophthalmia, and the one which serves to characterise it, and to which, as before observed, it owes its ordinary appellation, is a *profuse discharge of a thick yellowish fluid, resembling pus*. This fluid, however, is not really of a puriform nature; it is merely the mucous secretion of the conjunctiva changed in character, and is more correctly termed muco-purulent. It is secreted in a very great quantity, and from every part of the conjunctiva, but more particularly from its palpebral portions; and if it does not escape freely, it lodges within its folds, and thus, perhaps, contributes in some degree to the distension of the eye-lids.

The next symptom, which is especially remarkable, is the *enormous swelling of the palpebræ*, especially the superior. These are so much swollen from infiltration into their cellular tissue, as to render all voluntary attempts at separating them perfectly fruitless; they are also, externally, almost invariably of a deep red colour. In general, however, the palpebræ are easily separable by the judicious efforts of the surgeon, although in the early stage there is sometimes so much tension as to render it difficult.

When this separation has been accomplished, and the matter carefully removed, we then perceive that the conjunctiva is extremely red and vascular, in short, in a state of *chemosis*,—a state which is developed in this disease to its fullest extent; the conjunctiva being considerably raised, an œdematous effusion having been poured into the cellular texture under it, and a considerable part of the cornea, all round its circumference, being buried under the overlapping folds of the distended membrane. Sometimes, the swelling of the conjunctiva is so great that it even protrudes between the margins of the lids.

The consequence of the conditions just described is, that generally the patient has great pain about the eye and adjacent parts, which disturbs his rest and occasions him much anxiety. The constitutional irritation is otherwise not considerable, there being seldom any febrile symptoms developed. There is generally some intolerance of light, when the eye is exposed, but this never happens except for the purpose of examination or the application of remedies, owing to the excessive enlargement of the eye-lids.

*First, or Premonitory Stage.*—The symptoms just mentioned are not, strictly speaking, those which present themselves in the first stage of the disease. The first or purely inflammatory stage seldom continues more than about thirty hours, and is but rarely witnessed by the surgeon, as the patient scarcely ever applies for assistance until that time has elapsed. But when it does come under notice, nothing is perceived essentially different from what occurs in a severe attack of ordinary conjunctivitis, the chemosis and the purulent discharge not being then fully established.

Purulent ophthalmia usually attacks both eyes, and it is said more commonly begins in the right. It is certain that the one first attacked is generally the worst; that which is last affected frequently has the disease in a mitigated form. In most cases there is an interval of one or two days between one eye becoming affected and the disease appearing in the other.

*Extension to the Cornea.*—Distressing and unpleasant as this condition of the eye must certainly be to the sufferer, if the disease be confined to the eye-lids and conjunctiva no danger can result to vision; but unfortunately, it very frequently happens that the morbid action extends to the cornea, and proves destructive to vision. There is no perceptible vascularity of the cornea, at least in the early stages of the disease; and although there is undoubtedly inflammation of that texture, yet its existence is not manifested, except by its consequences, ulceration and opacity. The inflammation of the cornea is of the same violent character as that exhibited by the conjunctiva, but the difference in structure of the two parts occasions a considerable difference in the phenomena which result from this process. The structure of the cornea is so peculiar, that when inflamed it is exceedingly prone to fall into the condition of ulceration, and when the inflammation is more intense, it very frequently even sloughs. In the case of ulceration, the ulcerative process is not always

confined to its conjunctival covering. Deep and extensive ulcerous excavations are apt to occur, particularly around the circumference, and to penetrate the various laminae of the cornea; and, in the worst cases, it is not uncommon for the whole or nearly the whole of the cornea, sooner or later, to slough, for the humours to be evacuated, and the eye destroyed. In cases in which the ulceration, though it penetrates the cornea, is more limited in extent, a portion or portions of the iris protrude, and sometimes the crystalline lens escapes. When this last event happens, viz., escape of the crystalline lens, vision is seldom restored. With respect to opacity of the cornea, this may occur to a greater or less extent, either with or without ulceration.

Much has been recently said by various authors, as by Mr. Travers, Dr. Mackenzie, Mr. Middlemore, Mr. Tyrrel, and others, respecting the cause of the sloughing condition of the cornea, of which I have just spoken. These gentlemen are of opinion that it is to be attributed to pressure produced by the distended chemotic conjunctiva preventing the passage of the blood to the cornea, and thus giving rise to mortification and sloughing of it. I must candidly confess I cannot imagine that a membrane of so light and spongy a texture as the conjunctiva, even in a state of chemosis, can possibly produce such an amount of pressure as to cause strangulation of the vessels proceeding to the cornea. Of one thing I am certain—I have seen chemosis in its every grade of intensity which has not been succeeded by any sloughing; and, on the other hand, I have frequently seen sloughing without any preceding or accompanying chemosis.

*Origin of the Disease.*—Although purulent ophthalmia may be produced by the direct application of its own morbid secretion to a healthy eye, yet I conceive it to be much more frequently originated independently of such application. Thus, I have seen many instances of this disease in individuals who had not been near any one similarly affected, and in the vicinity of whose residences no other person was suffering from it. In these instances, it seems to be but fair to conjecture that the affection has resulted from cold or some of the ordinary agents which induce ophthalmia, operating upon individuals of peculiar predispositions.

Cases do now and then, however, occur, in which the disease has to all appearance been communicated from affected individuals to others who

have been in attendance upon them. I recollect an instance of this sort, which occurred some years since at the ophthalmic hospital of this town.

**CASE.**—An infant was attacked with purulent ophthalmia, which was of so severe a character as to destroy both eyes. An elderly female who had the care of the child also became similarly affected, from, as she stated, having accidentally had some of the purulent matter brought in contact with her own eyes. The disease in this female was of the same virulent character as that in the infant, and was also destructive of both eyes.

Purulent ophthalmia prevails very extensively in Eastern countries; in Persia, India, and more particularly in Egypt; and in those countries it is probably produced by the minute particles of sand with which the atmosphere is so often loaded, and which are brought into contact with the eyes; and perhaps also by the powerful reflection of the sun's rays from the sandy and desert wastes. The Egyptians are said not to regard it as being at all contagious.

The opinion has generally prevailed that purulent ophthalmia was originally introduced into Europe from Egypt, by the British and French troops, when they returned thence about the year 1802. Great numbers of soldiers were infected with the disease whilst residing there, and many of them were still labouring under it when they arrived at home. It is certain that the attention of English surgeons was not properly directed to it until after the Egyptian expedition; but that cases of purulent ophthalmia must have occasionally appeared in this country prior to the epoch just mentioned, can hardly admit of dispute, inasmuch as we now find them occurring sporadically, and to all appearance independently of any contagious influence whatever.

Purulent ophthalmia, nevertheless, once produced is unquestionably *contagious*.

I have mentioned one instance which came under my own observation, that forbids me to entertain any doubt on this point; and Sir James M'Gregor has reported several cases which I deem equally conclusive in reference to the contagious character of the disease.

**CASE.**—A nurse of the Military Asylum Hospital, at about eight o'clock A.M., while washing with warm water the eyes of a boy suffering severely from purulent ophthalmia, inadvertently applied the sponge which she had used to her

right eye. She immediately mentioned this circumstance to the other nurses, but took no means to prevent infection. Between three and four p.m. of the same day, great itching of the right eye took place, and before she went to bed it was considerably inflamed. Next morning her eyelids were swollen, she complained of pain on moving them, and the whole anterior surface of the eye-ball was much inflamed. A purulent discharge also began to trickle down the cheeks from the inner canthus. The symptoms increased in severity, and, notwithstanding the means that were used for her relief, the eye-ball burst in front of the pupil, on the fourth day after the application of the purulent matter. The sight of the eye was irrecoverably lost, and the inflammation continued for upwards of three months.

But although I have expressed my opinion that purulent ophthalmia once produced is unquestionably contagious, and although I have mentioned and referred to cases which seem to me fully to prove the correctness of such an opinion, yet it must be recollected that in these cases there was a direct application of the purulent matter from an affected eye to a healthy one. I am not aware that there is any good ground for thinking that the matter furnished by an eye affected with purulent ophthalmia evaporating, mixing with the atmosphere, and thus being brought into contact with a healthy eye, can give rise to the disease. Certainly I may mention one fact which, at first sight, may appear to favour that view, though when considered in conjunction with others that I shall mention, it will lead to an opposite conclusion.

A slave ship, *Le Rôdeur*, in the year 1819, had left the African coast fifteen days before any one on board exhibited symptoms of purulent ophthalmia, and there had been no cases of it at the port which she had last left. About one hundred and sixty negroes were crowded together in the vessel, and each of these was successively attacked. Such was the miserable condition to which they were reduced, that, on bringing them upon deck for the benefit of the fresh air, many of them threw themselves into the sea, in order to put an end to their sufferings. In a short time afterwards the crew were also attacked, one only of their number escaping, and he also became affected after his arrival in the West Indies. So virulent was the disease that thirty-nine of the negroes were blinded of both eyes, twelve lost one eye, and fourteen others had vision more or less impaired from opacities of the cornea; and of the crew, twelve men, one of these being the surgeon, lost both eyes; five,

one of these being the captain, lost one eye; and four others had extensive opacity of the cornea with adhesion of the iris.

Independently of the question of contagion, the history of this slaver affords a melancholy and instructive illustration of the frightful nature of this affection. Upwards of fifty persons, within the few weeks necessary to cross the Atlantic, all of them previously healthy, were attacked with a disease which, without materially affecting their bodily condition, left them in a state of total blindness, and nearly forty more had each one eye either entirely destroyed or seriously injured!

Now, at first sight, it may appear that, in this example, the disease was propagated from one individual to another by contagion. Such a conclusion, however, would not be correct. We cannot suppose that in every instance in which the disease originated, there had been a direct transfer of purulent matter from the eyes of an affected individual to those of a healthy one, as happened with respect to the nurses in the two foregoing cases. And further, it has been already intimated that purulent ophthalmia did not make its appearance until the vessel had been fifteen days out of harbour, and at the time of its departure did not exist among the inhabitants of the place. So that the disease was clearly of an epidemic character. There was evidently something peculiar in the state of the atmosphere in that region and at that particular period, to which the affection ought to be attributed, because the vessel in question, while on her voyage, encountered another vessel, the crew and passengers of which were in precisely the same condition. Another singular circumstance, powerfully tending to confirm this opinion is, that so soon as the crew and negroes of the first-mentioned vessel landed, the affection subsided and was not communicated to other persons on shore. And again, it is well known that the disease is often epidemical among soldiers in barracks, and sometimes among children in schools; but let the inmates be removed and they get quit of the disease, without communicating it to others. Moreover, we find that in most of the cases which have been clearly traced to the actual communication of purulent matter to a healthy eye, the disease has been confined to the organ so infected; whereas, in ordinary cases, where such communication has not been established, it is notorious that both eyes are almost invariably attacked. Hence the conclusion arises that, although this disease is of a



contagious nature, yet it cannot fairly be considered as ordinarily resulting from the application of a contagious matter.

*Treatment.*—The examples presented by the slave-ship amply prove the correctness of a statement previously made, that purulent ophthalmia ought not, on any account, to be allowed to pursue an uninterrupted course, but rather that a most decided treatment should be adopted for the purpose of arresting it. I cannot but think that, with respect to these cases, the disease was left to pursue its course uncontrolled, for the remedies employed, viz., poultices of rice and vermicelli, infusions of elder flowers, blisters to the nape of the neck, and pediluvia containing mustard, can only be regarded as utterly ineffectual to control a disease of so severe, so rapid, and so destructive a character. It is evident that the sailors manifested much more judgment than the surgeon, when they, as we are informed they did, dropped brandy into the eyes of the sufferers, and thus materially benefited them; and even a poor negress exercised more judgment than he, when, upon their arrival in the West Indies, she advised them to drop the juice of lemons upon the eyes, which remedy was also found of considerable use.

I regret that I cannot state with truth, that melancholy results, similar to those which occurred in the examples just mentioned, from an inefficient treatment of purulent ophthalmia, are no longer met with; for, in fact, notwithstanding the more extensive knowledge of the nature and treatment of this disease, which now, undoubtedly, prevails among the profession, many cases equally lamentable are continually occurring, in consequence of the treatment had recourse to having been either not judicious or not sufficiently prompt and decisive.

*Different views of treatment.*—I have just said that the treatment of purulent ophthalmia ought to be prompt and decisive. Unhappily, however, a wide difference of opinion exists as to the means to be employed.

By one class of writers and practitioners, the treatment is conducted on the most rigorous antiphlogistic plan, namely, by large and repeated bleedings, followed by cupping, leeching, scarifying, blistering, purging, and the administration of emetic tartar, in such quantity and so repeated as to keep up a state of continual nausea, perspiration, and faintness. In fact, they treat the patient as if he were labouring under acute inflammation of some vital organ.

By another class, local treatment is regarded as of paramount importance; and they propose to remedy the morbid condition of the eye by the application of very powerful stimulants to the diseased surface. The applications that have been employed for this purpose are numerous, though all are used on the same principle. Thus, some use the strong liquor plumbi subacetatis; others, oleum terebinthinæ, vinum opii, and various strong solutions of oxymuriate of mercury, sulphate of copper, and nitrate of silver. The advocates of the stimulant practice treat the subject of purulent ophthalmia as they would do one labouring under an attack of erysipelas, or an inflammatory condition of a mucous membrane, viz., by local stimulants and astringents. Indeed, both Walther and Müller, advocates though they be of the antiphlogistic treatment, regard the affection as essentially of a local character, confined in its origin to the palpebral conjunctiva; and the former expressly states that it is "not so much an inflammation as an exanthema."

With these two opposite modes of treatment before us, it may be considered a matter of some difficulty to decide as to which we are to select. Unquestionably, the result of a particular mode of treatment affords the best criterion of its utility, or otherwise. As many talented surgeons have adopted each of the plans of treatment specified, it may be advisable to give a somewhat fuller account of their proceedings, and the effects stated to have been produced by them; by so doing we shall be better able to appreciate the value of each.

Calling to mind that it is only within the last forty years that the subject of purulent ophthalmia has been distinctly before the profession, we can feel no surprise that the treatment of it should still be a matter of dispute.

From the melancholy effects produced by this disease, viz., destruction of the eye-ball and extinction of vision, it is not wonderful that surgeons should have entertained an exaggerated and erroneous notion respecting its nature and the tissues implicated. The incorrectness of medical language, too, has a decided tendency to originate and perpetuate incorrect views of the nature, and consequently of the treatment, of disease; and thus we find it to have operated as regards purulent ophthalmia. For example, at one time it was the custom to denominate this affection *suppurative ophthalmia*, a name which would almost of necessity create in the mind the idea of deep-seated inflammation and abscess, which,

as the natural inference, it would be concluded must be combated by the most powerful antiphlogistic remedies. Indeed, it may be doubted if the term ordinarily employed, and which I have adopted as being on the whole, perhaps, as little objectionable as any, viz., purulent ophthalmia, may not be similarly injurious. A more incorrect notion than this of suppuration it would be impossible to promulgate; for, as I have before explained, properly, the affection can be considered only as a purely local inflammation of the conjunctival membrane, which generally extends to the cornea, and proves fatal to vision, simply by inducing ulceration and opacity of this latter texture. It is, indeed, of the greatest importance that these two conditions should be carefully discriminated. On this point, however, I shall again remark in the section on OPHTHALMITIS.

*Antiphlogistic Treatment.*—Among the many experienced surgeons who have strongly advocated and thoroughly carried out the antiphlogistic treatment, I may mention more particularly Rust, Müller, and Walther, in Germany; and Vetch, Travers, and Lawrence, at home. These gentlemen advocate the abstraction of blood from the arm in quantities varying from thirty to sixty ounces, according to the severity of the disease, the strength of the constitution of the patient, and the ease or difficulty with which faintness is produced. Carried to that extent, they report blood-letting to have been decidedly useful, whereas small and repeated bleedings they report to have been of little service.

*Excision of Conjunctiva.*—After free venesection, Walther recommends that a large portion of the inflamed conjunctiva should be excised, the bleeding resulting from which operation he regards as a decided benefit, and he states that the cicatrix left in consequence is a mere line, and of no importance.

Scarpa advises “the circular excision of the projecting portion of the conjunctiva with the curved scissors, at the part where the cornea and sclerotica unite.” The same proceeding has been recommended by M. Sanson. Mr. Tyrrel urges the division of the conjunctival vessels, by incisions radiating from the margin of the cornea, so as to relieve the pressure which he supposes to result from their turgid state. I have seen this last practice adopted, but am unable to satisfy myself of its being at all capable of arresting the disease, or that it is deserving of the slightest confidence as a remedial agent. The former operation I have not seen practised. I think that there must be great difficulty in putting this treat-

ment into practice in the early stage of the disease, on account of the swelling and tension of the lids; and, in an advanced stage, it can hardly be serviceable.

*Nauseant Remedies.*—The adoption of the depleting system, combined with the exhibition of nauseating medicines, is forcibly urged by Mr. Travers. That gentleman says, “With large blood-lettings repeated, subject to the discretion of the practitioner, until the inflammation yields, a brisk catharsis should be combined, and this followed by a teaspoonful of a solution of emetic tartar every hour, so as to keep up a state of nausea, perspiration, and faintness.” He then proceeds to describe the favourable appearances observable, when the violence of the disease has been moderated by this treatment. “But if (he continues), when the lowering practice has been pushed to the extent of arresting acute inflammation, the patient being at the same time sunk and exhausted, the cornea shows a lack-lustre and raggedness of its whole surface as if shrunk by immersion in an acid, or a grey patch in the centre, or a line encircling or half encircling its base, assuming a similar appearance, the portion so marked out will infallibly be detached by a rapid slough, unless by a successful rally of the patient’s powers we can set up the adhesive action, so as to preserve in situ that which may remain transparent.” So that, from Mr. Travers’s statement, it appears, notwithstanding this very active treatment, the eye will be very frequently lost, except the patient can be speedily extricated from the sunk and exhausted condition to which he has been reduced by the means intended for its preservation.\*

*Objections to Antiphlogistic Treatment.*—Now, all these directions may appear to some to be exceedingly plausible. We see very acute inflammation both on the surface of the eye and the eye-lids. The inference seems natural enough that we must bleed very largely, in order to reduce that inflammation. Nothing, however, can be more fallacious than the reasoning of these authors, when it comes to be tested by matters of fact. Bleeding, I am satisfied, is not the right, certainly not the best, mode to set about the reduction of the inflammatory state of the eye in the disease now under consideration. I had frequent opportunities, some few years ago, of witnessing this kind of practice carried to its full extent. The patients

\* Sir W. Adams also advised the exhibition of emetics, so as to keep up a state of nausea and vomiting for eight or ten hours.

were bled freely from the arm ; they were then cupped and leeches, and had tartar emetic and purgatives, and all the usual remedies of this class freely exhibited. But, in spite of all, the inflammation was not subdued ; it proceeded on its course ; it extended to the cornea ; it was followed by opacity, and ulceration, and sloughing, and the eye was generally lost.

So far, indeed, from this practice being useful, I am of opinion that it is decidedly injurious, inasmuch as it tends seriously to impair the constitution of the sufferer, rendering it less able to struggle successfully with the after stages of the disease, or to repair the mischief when sloughing has occurred.

The subjects of purulent ophthalmia are not, indeed, generally of that class for whom we would willingly order very copious venesection : such, at least, is the conviction on my mind, resulting from observations made principally among hospital patients. The experience of other surgeons on this point may not coincide entirely with my own, and perhaps military surgeons in particular may have ordinarily a more robust class of patients to deal with. In the cases, too, which have come under my notice, there has never been any marked constitutional disturbance, there have never been any febrile symptoms present, and very often there was rather a depressed than an excited state of the general circulation.

Nor does purulent ophthalmia ever manifest a tendency to extend to the internal textures, so as to justify the employment of the severe antiphlogistic measures which have been recommended. In no instance that I have witnessed has this ever happened ; and it is a generally admitted fact, that neither pus nor effused lymph has ever been observed in the anterior chamber.

The indifferent success following the adoption of the antiphlogistic treatment, even by its most ardent eulogists, is very striking. Thus, Dr. Vetch, who was in the habit of taking fifty or sixty ounces of blood from patients affected with this disease, reports that in fifty cases out of six hundred and thirty-six both eyes were lost, and that in forty more one was lost. No doubt, too, in a great number of the rest, vision was much impaired from opacities. Other accounts are still more unfavourable. Surely, if no better success attended the employment of this treatment in other inflammatory affections, practitioners would soon cease to place dependence upon it. And when it is borne in mind that these statements refer to a class of patients who, it is certain, enjoyed every possible advantage, having been

placed under the strict surveillance of a military hospital, and generally attended to in the very first stage of the affection, our confidence in it is not likely to be increased.

Another striking fact may be mentioned, which is by no means calculated to add to our confidence in it, viz., that at one period (1810) there were 2,137 individuals in the military hospitals of Chelsea and Kilmainham, who had lost both eyes from purulent ophthalmia, exclusive of others who had lost one eye, and were otherwise damaged, most of whom, I believe, had been subjected to the antiphlogistic treatment.

Most authors, indeed, who have advocated the lowering treatment, are compelled to admit that, in spite of its being most energetically employed, the purulent form of ophthalmia will frequently terminate in destruction of the organ attacked.

The arguments I have adduced against antiphlogistic treatment generally, apply with still greater force to the employment of *mercury* in purulent ophthalmia. I can hardly imagine any kind of practice so every way objectionable.

*Stimulant Treatment.*—From the tenor of the remarks before made, respecting the management of conjunctival inflammation generally, as well as from my expressed disapprobation of the antiphlogistic treatment of purulent ophthalmia, the reader will, no doubt, be prepared to expect that I shall avow myself an advocate of the use of stimulants in the treatment of this, as well as of the other varieties of conjunctivitis, of which I have before spoken. I proceed to state my reasons for so doing.

In the first place, I will glance at the evidence of a few of those practitioners who have tested the efficacy of the stimulant treatment; and, in so doing, I am glad to have it in my power to appeal to the evidence of practitioners, who have derived their experience both from civil and military practice; since, on this account, no fair ground of exception can be taken from any supposed difference of constitution among particular classes of patients.

It is worthy of especial remark, that the advocates of the stimulant treatment inform us, that they were absolutely driven from the employment of antiphlogistic remedies, such as large and repeated bleedings, &c.,—a practice into which they had been early initiated, both by precept and example,—by the utterly unsuccessful results they had the mortification, almost invariably to find the only reward of their labours.

As being in accordance with this statement, I would first allude to the testimony of Dr. O'Halloran. This gentleman had extensive opportunities of treating purulent ophthalmia, as it prevailed in the army some few years since. Having become dissatisfied with antiphlogistic remedies, he had recourse to sulphate of copper, which he applied to the conjunctival surfaces of the lids; and sometimes he used a ten-grain solution of nitrate of silver: one or other of these was applied daily. "The effects of sulphate of copper (says he) in removing the affection of the parts, and allaying the irritation, are remarkable. I can safely say, that abstraction of blood will be rarely necessary in this disease, if the plan recommended be strictly adhered to; and I, moreover, am of opinion, that if any inquiry be instituted amongst the army surgeons, it will be found that those who used the greatest depletion were the least successful practitioners; and that sloughing, ulcers, &c., more frequently succeeded the evacuating plan than when the patient was partly left to nature." This is, certainly, very strong and convincing testimony, and emanating, as it does, from a practical man, who had extensive opportunities of trying and comparing both modes of treatment, is clearly entitled to very great consideration.

Mr. Guthrie, also, is an ardent advocate of the stimulant treatment. He generally employs the nitrate of silver made into an ointment, in the proportion of two grains of the nitrate to a drachm of simple cerate. This he recommends to be applied with a camel-hair brush between the eyelids, so that it may be placed in contact with the morbid conjunctiva. He likewise mentions, that he formerly found very beneficial results to follow the dropping of tincture of opium upon the eye; but he is now disposed to give the preference to the nitrate of silver ointment. I observe, however, that Dr. Littell, of Philadelphia, in his recent publication on "Diseases of the Eye," states, that this ointment, though so highly extolled by Mr. Guthrie, has not, in his hands, equalled the expectations which he had been led to entertain respecting it.—"It occasions (he further states) more irritation than the caustic, in substance or solution, is more variable in its effects, and should be restricted to chronic and torpid cases." Not having myself used the nitrate of silver ointment in purulent ophthalmia, I am unable to offer an opinion as to its efficacy.

Dr. Bidgway, who had likewise extensive opportunities of witnessing the results of cases of purulent ophthalmia in soldiers, appears to have

been among the first to abandon the use of antiphlogistic remedies in favour of that of stimulants. To him belongs the merit of having first employed the nitrate of silver in solution, in the management of this disease.

Having now briefly noticed the sentiments of a few of those practitioners who have advocated the stimulant plan of treatment, I will add upon the same topic a few observations, the result of my own personal experience.

*Treatment with Nitrate of Silver.*—I have already stated it to be my opinion, that the antiphlogistic treatment of purulent ophthalmia is both useless and improper. I have never myself employed bleeding, either generally or locally, in any of the cases of this affection, which have come under my own care within the last sixteen years. Having, for some time previously, been in the habit of witnessing the admirable effects of stimulants in the treatment of some other varieties of conjunctivitis, it seemed to me that they might be equally serviceable in that of the disease in question; and I believe I was the first to employ the nitrate of silver in substance, in this variety of ophthalmia: at least, no published statement of any such employment of it, had appeared at the time when my paper, detailing some cases in which it had been successfully used, was published in *THE LANCET* (vol. ii., 1830—31, p. 619). The result, as regards my own mind, from my practice with this article in substance, is, that I have great confidence in my ability to check by it the progress of the affection; and, at the same time, a conviction, that very few if any cases of it will terminate unfavourably, if this treatment be resorted to before any deep-seated ulceration or sloughing has commenced.

I may observe, also, that Dr. Littell has given his testimony very strongly in favour of my mode of treating purulent ophthalmia. "It is in this form of ophthalmia (says he) that the nitrate of silver most remarkably displays its sanatory powers, and constitutes indeed our principal reliance. Applied in substance to the inner surface of the palpebræ, it diffuses its influence by continuous sympathy over the whole conjunctiva, while it also acts directly upon the opposing surface of the globe; and, in the severer grades of inflammation, is decidedly preferable to the forms of solution or ointment." The nitrate of silver in substance is



now, likewise, generally preferred by the most eminent French surgeons.\*

I have already given some directions respecting the mode of employing the nitrate of silver in substance. But, in the variety of ophthalmia now under notice, it is requisite that it should be applied more freely than in instances of ordinary conjunctivitis.

In the early stage of purulent ophthalmia, the palpebræ are sometimes so tense that it is not easy to produce sufficient eversion so as to allow of the nitrate being applied very extensively. In this case, we must insinuate it gently beneath the margin of each lid, and allow it to touch as much of the conjunctival surface as we can. It may also, with great propriety, be allowed to come in contact with as large a surface of the chemosed conjunctiva as possible; and, with a pretty large surface of it, it may often be brought in contact, because, as I before observed, there is frequently a considerable bulging of the membrane between the lids. In cases of this kind, we need not be under the slightest apprehension as to any unpleasant effects being likely to follow the free use of the nitrate of silver: it may be safely allowed to remain in contact with the conjunctiva for a few seconds.

As the disease advances, the difficulty of applying this remedy diminishes, for the tension of the eyelids gradually wears off, and they often become much relaxed, with a decided tendency to eversion, and are sometimes indeed considerably everted.

In the early stage, while there is a chance by vigilant attention of saving the eye, the nitrate should be freely applied at least once in each day, until the chemosis and the puriform discharge are so much lessened as to leave no doubt that the violence and danger of the disease have passed away. On some occasions, I have repeated the application morning and evening, more particularly when ulceration of the cornea had occurred to any considerable extent.

The nitrate of silver I regard as the sheet-anchor in the treatment of purulent ophthalmia. If it be properly and efficiently used, but little else can be necessary: without it, I should entertain but little expectation of a successful issue of any case at all severe in character.

*Other Local Remedies.*—It will be very proper, as a means of keeping

\* See M. Ricord's recent work on the Venereal Disease.

up the stimulant action, excited by the nitrate of silver, to recommend the injection upon the conjunctival surface of some stimulant fluid, such as a solution of the sulphate of copper, say three or four grains of the sulphate to an ounce of water. This process may be repeated more or less frequently, according to the severity of the attack. Some have advised injections to be used for the mere purpose of washing away the discharge, considering that its presence upon the surface of the cornea is productive of injury. This notion may, or may not, be correct; but, whichever it be, as the amount of discharge is generally in proportion to the severity of the disease, it will, as a general rule, be advisable to direct the use of the injection whenever there is a fresh accumulation of matter perceptible. I should be inclined to say, however, that injections are more proper when the cornea is in a state of sloughing or ulceration: when only the conjunctiva is affected, they are not so necessary.

As the palpebral margins are generally adherent to one another, after the patient has been asleep, it is proper to apply to them each night a small portion of the red precipitate ointment; and, as this application is capable of promoting the general object of bringing about a healthy condition of the diseased membrane, this is an additional reason why it should be used. It should not merely be smeared upon the tarsal margins, but a small quantity should be introduced upon the conjunctiva of the lower lid, in the manner before directed.

If there be much external heat, it will be advisable to recommend the constant application of cloths dipped in cold water, or some refrigerant lotion, such as the ordinary saturnine lotion, to the eyelids and contiguous parts. In some individuals, however, as is well known, cold rather aggravates the painful and unpleasant feelings than otherwise, and then the lotion must be used in a tepid or warm state; but frequent ablution, in one form or another, should not be omitted; or we may recommend the use of one or other of the sedative applications before advised, or an infusion of belladonna, opium, or hyoscyamus.\*

The means I have now pointed out, appear to me to constitute all that are essential for the local treatment of purulent ophthalmia.

*General Treatment.*—With respect to the general treatment, but few observations are needed. If the patient suffer so much from pain that his sleep is disturbed, it will be proper to prescribe from a grain to three

\* See Formulae, p. 10.

grains of opium, to be taken at bed-time. This, however, in my practice, has scarcely ever been necessary. I have always found the nitrate of silver the best opiate. However much a patient may complain on his first presenting himself, (and sometimes I have been told that he has not slept for four or five days or a week, in consequence of the suffering he has endured,) I have generally been informed, that, after the application of the nitrate, though the uneasiness had been much increased for an hour or two, he had slept almost as soundly as ever the following night.

The due action of the bowels should be kept up by the occasional administration of mild purgatives, such as appear suited to the peculiarities of the individual. By producing and keeping up a state of excessive purging, I cannot see that any benefit can be gained, since by such practice debility of the system is induced, and, as a consequence, I think, greater evil than good.

If the patient be at all delicate, and a sloughing condition of the cornea be impending, and more particularly if the antiphlogistic treatment has been resorted to in the early stage, I should be inclined to recommend a good and generous diet, including wine, and also the exhibition of quinine and other tonic medicines.

But, notwithstanding what has been said, it should be observed, that it is not to be expected the stimulant treatment will suddenly terminate purulent ophthalmia, though it will certainly arrest its progress, if applied in a proper way, and at a proper time. A certain time will elapse before the morbid action subsides, let the treatment be what it may. The precise duration of it will vary according to the severity of the case, and the period at which the treatment is commenced, but it will seldom be under a month or six weeks; and, frequently, it will continue in a mitigated form for two or three months, or even longer. Nevertheless, I am quite satisfied that the duration, as well as the severity, of an attack will be lessened by the early adoption of the local stimulant, incomparably more than by the general depleting treatment.

Some practitioners, convinced of the propriety of using local stimulants, yet deem it safer, perhaps, to combine with them a portion of the antiphlogistic treatment: thus, they usually commence with one rather copious bleeding from the arm, then apply a number of leeches to the outer surface of the palpebræ, and afterwards have recourse to some of the

strong, stimulating applications before mentioned. Dr. Mackenzie, Mr. Guthrie, and others, have recommended this mixed plan of treatment to be pursued.

*Combined Antiphlogistic and Stimulant Treatment.*—On the subject of blood-letting, in conjunction with the stimulant treatment, Dr. Mackenzie observes, “ We ought neither to delay the abstraction of blood, if the symptoms are smart, and the case of some days’ standing ; nor ought we, on the other hand, to indulge in the absurd expectation, that profuse blood-letting is to check the disease completely without the use of local applications. I hold any notions of this kind, which some may have entertained, as crude and irrational, and their practice as, perhaps, the most destructive which could be followed. By very profuse blood-letting, the patient is too much reduced, and the eye rendered more susceptible of disorganisation. We must not for a moment indulge in the fancy that the stream of blood is to be allowed to flow, till the redness of the eye fades under our view, nor are we even to make the cessation of pain in the eye the condition for stopping the bleeding. These effects might not be obtained by abstracting fifty or sixty ounces of blood, whereas the same real benefit will follow in the course of an hour or two, if not more than twenty or thirty be taken, the patient will be less debilitated, and the course of the disease with greater certainty abridged.”

The amount of blood-letting, here recommended, is certainly moderate, compared with that recommended by some other surgeons ; but still, in all conscience, I must confess that it is quite enough, nay, more than enough ; for I do not think, as I before stated, that any blood-letting whatever is required. Even Dr. Mackenzie himself seems to attach, indeed, but a very doubtful degree of importance to this practice of blood-letting. I must say, with respect to myself, it is a question whether blood-letting, carried to any extent likely to debilitate the system, is not more calculated to produce sloughing of the cornea than to prevent it.

The treatment I have so strongly advocated, I wish it to be understood, is equally applicable to any and every stage of purulent ophthalmia. It is in the early stages, however, that I am more particularly anxious to urge its adoption ; because, in the latter stage, if ulceration, or more particularly, sloughing of the cornea have set in, the conjunctival membrane assumed a paler aspect, the discharge become thinner and more watery, and the tension and swelling of the palpebræ have disappeared, no one, it

may be presumed, would ever contemplate any other than the stimulant treatment.

*Results of Purulent Ophthalmia.*—I have before remarked, that so long as the disease is confined to the conjunctiva, no danger to vision can possibly result. It is only by its extension to the cornea, that any danger of this sort arises: therefore, the condition of this structure ought always to be an object of especial solicitude, and ought invariably to be most carefully investigated, whenever a patient presents himself for examination.

When deep-seated ulceration or sloughing has commenced, the nitrate of silver should be daily applied directly to the affected portion or portions of the cornea, as well as to the conjunctiva; the other stimulant remedies, before recommended, may also be used.

The prognosis, in cases of this last description, must always be extremely doubtful; for the humours, more particularly the aqueous and crystalline, are very apt to escape through the cornea, when it is perforated either by ulceration or sloughing. Of course, the mere escape of the aqueous humour is not an important event as regards vision, but often a portion of the iris protrudes, and the cornea, at the point of ulceration, is liable to project and become partially staphylomatous.

In some instances, not only are the aqueous and crystalline humours evacuated, but a portion of the vitreous humour also escapes, and then the globe is reduced to a small tubercle (*atrophia oculi*), and appears to recede into the orbit.

Occasionally, the cornea so sloughs as to leave nothing behind it but a thin almost transparent membrane, which might be supposed to be the membrane of the aqueous humour, and which extends in front of the iris, and appears to be in contact with it. In such case, sometimes the patient's vision is restored, but only temporarily and partially, as he soon discovers.

In other instances, a general enlargement, attended with opacity and protrusion of the entire substance of the cornea takes place, and then the eye projects out of the orbit, and between the margins of the lids, so as often to prevent their closing; this is the condition termed *staphyloma*.

Yet, sometimes we meet with truly astonishing cases, in which the cornea, from being almost entirely opaque and very extensively and deeply ulcerated, ultimately becomes again quite transparent, and vision is restored to the almost natural degree of perfection.

Less degrees of ulceration, in which only a portion of the iris escapes (*prolapsus iridis*), may heal without much interfering with vision, and without causing any particular deformity; but, if ulceration takes place at several points, the probability is that staphyloma will succeed, and the eye be rendered useless.

Sometimes partial, at others considerable, opacity remains, and, if it occupy the centre of the cornea, will, of course, obscure the pupil, and may either destroy or very materially impair vision: yet, if a moderate portion of its circumference remain transparent, there may still be hope of regaining useful sight, at some future period, by an operation for artificial pupil.

After the more violent symptoms of the diseased action have subsided, or have been subdued, it is very common to find a rough, granular, and thickened condition of the palpebral conjunctiva, which may remain for a considerable period. This is more commonly the case when the treatment has been general rather than local; and I consider, that one great advantage of the local stimulant treatment, consists in securing a comparative exemption from a series of disagreeable and very troublesome sequelæ, which, when they occur, as they are very apt to do in neglected cases, or after the adoption of the antiphlogistic treatment, are almost sure to keep up irritation for a very long time, and, indeed, have sometimes, even after the patient had escaped the danger of the original disease, been followed by so much ulceration, vascularity, and opacity of the cornea, as ultimately to destroy vision. When such sequelæ remain, they should be treated by the direct application of the nitrate of silver, or the sulphate of copper, either in substance, solution, or ointment: and these preparations often require persevering with for a considerable period. In these protracted cases, I have usually found that the sulphate of copper, in substance, is deserving of the preference.

*Evacuation of the Aqueous Humour by Operation.*—I should not make my account of the various modes of treating purulent ophthalmia complete, if I were to omit mentioning a practice, which has been recommended by some able surgeons, as Mr. Wardrop and Sir Patrick M'Gregor, viz., the evacuation of the humour of the anterior chamber. This operation has been advised, with a view to prevent what is termed *bursting* of the cornea. The idea which suggested it, appears to have been that which led to the disease being designated suppurative ophthalmia. What is an

error is assumed as a truth, viz., that the morbid action proceeds from within outwards, and that there is a pressure, sufficient to lacerate the cornea, exerted upon it from within, and which can be removed by the evacuation of the aqueous humour. Now, the reverse of this is notoriously the case; the mischief always spreads from without inwards; the cornea never is burst by mechanical pressure from within; it is decidedly a process either of sloughing or ulceration, by which its integrity is destroyed. The operation, therefore, appears to me irrational; I cannot conceive that it can be productive of any good, nor has it been sanctioned but by very few ophthalmic surgeons.

CASE.—G. C., æt. 58, presented himself with the usual symptoms of purulent ophthalmia; the disease affected both eyes, and had existed about a week. He attributed it to exposure to cold. The conjunctiva of the left eye, which was attacked first, in addition to considerable swelling and redness of the lids, was excessively chemosed, and somewhat over-lapped the margin of the cornea, which latter exhibited a sloughy and opaque condition of its entire substance. Similar tumefaction and vascularity were presented by the palpebræ and conjunctiva of the right eye; but the cornea remained transparent, although an ulcer was observed to extend round its nasal semicircumference, and had the appearance of a deep excavation, and, as if it were just about to penetrate into the anterior chamber. There was a considerable discharge of matter from both eyes; and there was great complaint of pain. I applied the nitrate of silver freely to the conjunctival surface of the lids every day for the first week, and afterwards every second or third day; the crystalline lens, in the mean time, escaped through the sloughy cornea of the left eye, which afterwards shrunk and ceased to be troublesome. The ulceration of the right eye did not extend in circumference, though it perforated the cornea, and allowed a portion of iris to protrude. The nitrate was diligently applied to the ulcer, and it eventually healed, without any injury to vision. At the end of two months, there was no trace of the disease in this eye, except a slight irregularity of the pupil, and some opacity at that part of the cornea where the ulcer had existed. No other treatment was resorted to, except an occasional purgative, and the use of a solution of sulphate of copper.

#### GONORRHOEAL OPHTHALMIA.

I have already intimated, that there is no essential difference between this form of ophthalmia and that last described; the symptoms of both are similar.

*Symptoms.*—In gonorrhœal, as in ordinary purulent ophthalmia, there are excessive tumefaction and redness of the palpebræ, and acute conjunctival inflammation, attended with chemosis and profuse muco-purulent

discharge. Similar destructive results are produced by neglect or improper treatment of these forms of ophthalmia. However, the symptoms of gonorrhœal are said to be more aggravated than those of purulent ophthalmia, and its progress is also said to be more rapid than that of the latter affection. It is likewise found very commonly to affect *only one eye*; but its distinctive peculiarity appears to be confined solely to the cause by which it is produced, viz., *the gonorrhœa*.

It is not easy to conceive how this form of the disease can be more severe than the one of which I have previously spoken, in which the patient, as we have seen, too often has lost both eyes in a very short time; and yet it would seem that a patient usually has a less chance of recovery from an attack of gonorrhœal than from one of purulent ophthalmia.

I have just said, that in the majority of cases only one eye suffers. In some cases, however, both are affected. I have myself seen several such; and Mr. Lawrence has given fourteen cases of acute gonorrhœal ophthalmia in five of which both eyes were affected. The rule, therefore, that gonorrhœal ophthalmia only affects one eye does not so generally hold good as that ordinary purulent ophthalmia affects both eyes. Dr. Vetch states of the latter, that there is not one case in a thousand in which one eye only is affected. If this be a correct statement, and I apprehend it is so, for I have never met with but one case of purulent ophthalmia in an adult in which both eyes were not affected, we may safely infer, that where one eye only is the subject of purulent ophthalmia, the case is one of gonorrhœal ophthalmia; but we cannot be so certain that when both are affected the case is not gonorrhœal, without reference being had to various circumstances of its history.

*Origin.*—Gonorrhœal ophthalmia is supposed to originate in three different modes; first, by an actual contact of gonorrhœal matter with the eye; secondly, by metastasis, the gonorrhœa being suddenly transferred from the urethra to the mucous membrane of the eye; and thirdly, in connexion with a peculiar state of the system which sometimes attends gonorrhœa.

Of these three modes in which the disease is supposed to originate, the first, viz., by gonorrhœal matter being brought into *actual contact* with the eye, is *probably by far the most common*. When we consider, *on the one hand, how often persons infected with gonorrhœa are applying*



their fingers to the diseased parts, or to the clothes on which the virus is deposited; and, on the other, how frequently the fingers, in every individual, are applied to the margins of the lids, and that almost unconsciously, we cannot but admit that this must be a very common way of exciting gonorrhoeal ophthalmia. Many well-authenticated cases, in which the disease was thus excited, are on record. I select the following, as related by Dr. Mackenzie:—

CASE.—A patient was brought to me some time ago from the country, by a gentleman under whose care he was, with his left eye violently inflamed and chemosed, the chemosis of a pale-red colour; the conjunctiva discharging a large quantity of purulent fluid, the lower lid greatly everted, and the cornea, from lymph, and probably pus, effused between its lamellæ, totally opaque. This patient was affected with gonorrhœa, and thirteen days before I saw him while engaged in removing the discharge from the urethra, a drop of the gonorrhœal matter was by mischance thrown fairly in upon his left eye, and excited the severe puro-mucous ophthalmia under which he was labouring. The inflammation of the eye subsided under appropriate means, the cornea cleared to a degree far beyond my expectations, and a considerable share of vision was preserved. The right eye was not at all affected.

That gonorrhœal ophthalmia is ever the result of *metastasis*, it must be admitted, is very questionable. St. Yves, originally, and Richter, Beer, and some others subsequently, have advocated this view, but very few English surgeons seem to favour it, and Scarpa states that he is satisfied “that metastasis of gonorrhœa to the eye is a chimera.”

Of that form of gonorrhœal ophthalmia which is supposed to be of *constitutional origin*, I may remark, that cases of purulent ophthalmia are sometimes met with in individuals affected with gonorrhœa, in whom as far as we can ascertain, there has been no communication of gonorrhœal matter to the eye, nor any suppression of the discharge from the urethra. In some of these cases, the purulent ophthalmia may be accidental; in others, it may have arisen from some constitutional taint analogous to what occurs in syphilis. We know that the eye is frequently attacked with syphilitic ophthalmia, the result of a constitutional affection, and not of any local application of the syphilitic virus; and such it is fair to presume, may also be the case with respect to gonorrhœal ophthalmia. Further, we have seen that ordinary purulent ophthalmia frequently arises without contagion; and, for anything that appears to it

contrary, the state of the constitution, when infected with gonorrhoea, may favour a predisposition to this variety of ophthalmia, as it appears to do to some other affections.

*Treatment.*—The treatment of gonorrhoeal ophthalmia, it is generally admitted, does not at all depend upon the cause which may have produced it, if we except such cases as are supposed to arise from metastasis. The advocates of this doctrine recommend that bougies, dipped in the matter from the conjunctiva, should be introduced into the urethra, with a view of reproducing the original disease, a practice which it is presumed would be effectual in relieving the morbid condition of the eye. This absurd practice, I need scarcely say, is never resorted to by English ophthalmic surgeons.

The same diversity of opinion, as to the merits of the antiphlogistic and stimulant modes of treatment, before noticed when speaking of purulent ophthalmia, also exists with regard to the treatment of the gonorrhoeal variety of this disease. Considering that both diseases are essentially alike in their nature and the symptoms which they present, there can, indeed, be no just ground for supposing that the treatment should vary; but, as the gonorrhoeal is probably more rapid in its progress, and more destructive in its results, than ordinary purulent ophthalmia, the treatment should therefore be proportionately more energetic and more decisive.

Mr. Lawrence, who may fairly be considered as the representative of the antiphlogistic class of practitioners, thus expresses his views of the treatment of gonorrhoeal ophthalmia:—"The only chance of arresting this violent disorder, and preserving the eye from its destructive effects, is afforded by the boldest antiphlogistic treatment; particularly by the freest abstraction of blood, generally and locally. We must bleed largely from the arm, and take blood by cupping on the temples, or by numerous leeches applied round the part; and these measures must be repeated at short intervals, until the vascular congestion is relieved, and the attendant pain removed. The other parts of the antiphlogistic treatment must be combined with this free abstraction of blood; but our great reliance must be placed on the latter."

I may here state that Mr. Lawrence, some few years since, published a work on the venereal diseases of the eye, from which the preceding observations are quoted, and in which he gives a detailed account of

fourteen cases of gonorrhoeal ophthalmia, in which the treatment here advocated was fully practised. The reader may be curious to know what were the results of that treatment in the hands of so able, so zealous a practitioner. I will furnish him with a brief summary of them. Of the fourteen cases, nine had the disease in only one eye: six of these were lost, and but three recovered. The other five were affected in both eyes: of these, one lost both eyes; two lost one eye; one recovered both eyes, with imperfect vision; and one only recovered completely. So that of the whole fourteen cases, but four can be said to have properly recovered. This is certainly very valuable evidence as to the effects of antiphlogistic treatment in gonorrhoeal ophthalmia.

This gentleman, however, "infers not that antiphlogistic treatment is incapable of arresting this inflammation, but that it has not been employed to a sufficient extent; and if I had to treat (he continues) some of these cases again, I certainly should bleed more freely. I think that as much blood should be taken from the arm as will flow from the vein, and that the evacuation should be repeated, as soon as the state of the circulation will allow us to get more." And, by way of encouragement, he then proceeds to favour his readers with the following quotation from Mr. Bacot on this subject, who heroically observes:—"These are cases which defy all the usual etiquette of regular and ceremonious visits. If we wish to save our patient from the destruction of his vision, we must scarcely depart from his bed-side until the inflammatory symptoms are controlled. The lancet must be hardly ever out of our reach, for if ever there was a disease in which blood may be taken away without limitation, it is this." But this is not all: Mr. Lawrence calls in further testimony in corroboration of his views. "Mr. Wardrop informed me (he adds) that the only case of gonorrhoeal ophthalmia he had seen in which the eye was saved, was that of a young woman, in whom venesection was repeated as often as blood could be got from the arm. She lost 170 ounces in a few days, and looked as if every drop of blood had been drained from her body; the skin having nearly the hue of a wax candle."

As the best commentary I can, perhaps, offer on the extraordinary statements here made, as well as to prove the correctness of my view as to what constitutes the proper treatment of this disease, I will now give a history of a case of gonorrhoeal ophthalmia, which has recently

been under my care, in which the eye was saved by an equally simple and rather less dangerous practice.

CASE.—Mr. A., æt. 19, apparently in the enjoyment of full health, called upon me, on the 1st of November, to consult me relative to an affection of his left eye, which had commenced on the preceding day, and which exhibited the following symptoms:—The palpebræ, particularly the superior, were much swollen and very red. On endeavouring to separate them, there was so much tension as to render it difficult to obtain a view of the eye-ball; only the inferior portion of the cornea could be seen, and on it was observed a slight appearance of ulceration, as if in the incipient stage, and quite superficial. The conjunctiva of the inferior portion of the eye-ball was in a state of the most violent inflammation, attended with excessive chemosis, and bulged forwards between the separated margins of the lids. There was a considerable discharge of a thick muco-purulent fluid, which occasioned the tarsal margins frequently to adhere, and there was also a good deal of lachrymation. He had not much pain about the eye, nor was there any constitutional disturbance. The right eye was unaffected. Seeing that it was a decided case of purulent ophthalmia, and confined to one eye, I inquired if he had any gonorrhœal discharge. This he at first denied, but afterwards admitted; and, on being further questioned, said that he was not aware of having brought any of the gonorrhœal fluid into contact with the eye, although he appeared to be impressed with the idea, that there was some connexion between the two diseases. I immediately applied the nitrate of silver to as much of the conjunctival surface as could be got at, allowing it to remain a short time in contact with it, particularly with the chemosed portion at the inferior part of the eye-ball. This produced very severe pain, which continued for about half an hour, at the end of which time he returned home. I advised him to remain at home, indeed, to keep to bed for two or three days, and to have the lids very frequently fomented with warm water. I also prescribed four grains of calomel, to be taken at bed-time, and a draught of senna infusion with salts, for the following morning. The next day I visited him at his own residence, and found the eye in much the same condition as on the previous day. The nitrate of silver was again applied, and the other remedies ordered to be continued. On the *third* day the swelling and tension of the palpebræ were so much diminished, as to admit of their being freely separated, and the whole of the cornea to be exposed to view. The ulceration was found not to have extended; the bulging portion of the conjunctiva had subsided; and the vascularity was much diminished. The discharge was still considerable, and of the same character; the bowels had been kept open by the medicines before prescribed. The warm water was found to be very grateful, and always to afford relief, when the eye was uneasy. The nitrate of silver was freely applied to the conjunctival surface of both lids. On the *fourth* day the eye

appeared still better. The nitrate was again applied. On the *fifth* day he was so much improved that he came to see me. The palpebræ were now nearly of the natural size, the chemosis gone, but the conjunctiva still very vascular, and the ulceration of the cornea not quite healed. The discharge was diminishing, though still free; he complained of no pain, and his vision was not materially impaired. The nitrate of silver was again applied, and the other remedies recommended to be used occasionally. From this time the nitrate was applied every other day, until the *ninth*, when the eye appeared so much better that, at his urgent request, I gave him leave to go into the country for two or three days, on some particular business. On his return, on the *thirteenth* day, I found all the symptoms aggravated; the swelling and redness of the palpebræ, the chemosis, and the discharge had all returned, but not quite to so great an extent as at first. Several opaque spots were also observable on the surface of the cornea, which looked exceedingly dim, more particularly at the lower portion. Vision was now more obscured than at any previous period of the existence of the disease, as he could scarcely discern any object with this eye. The nitrate of silver was re-applied, the aperient medicine ordered to be repeated every day, and the eyelids to be frequently bathed with warm water. The nitrate of silver was now applied daily, until the 17th, when the condition of the eye had again become much improved; the chemosis was entirely gone, but the conjunctiva was still very vascular, its vessels encroaching slightly upon the circumference of the cornea, and forming a red zone around it; the opacity of the cornea was all but gone, but little discharge escaped, and vision was very distinct. The nitrate of silver was applied rather lightly, and to the inferior eyelid only. On the 24th, the disease had all but disappeared, slight vascularity and a little roughness of the conjunctiva of the inferior eyelid alone remaining. The sulphate of copper was applied. This patient called upon me again, in about a fortnight from the last-named date, when the eye was perfectly well.

I have given rather fully the details of the above case, because I consider it a very important and instructive one. It will be seen that the treatment was commenced on the second day of the attack; all the symptoms were of an aggravated character; ulceration of the cornea was already apparent; the chemosis was developed to the fullest extent, and the tension of the palpebræ was excessive; this last symptom, Mr. Lawrence considers to denote the worst kind of case. This case, then, certainly not a mild or trifling one, was cured without the abstraction of a single drop of blood, and with no other local applications than the nitrate of silver to the conjunctival, and warm water to the cutaneous surface of the lids.

In the following case the disease had arrived at an advanced stage before the patient came under my notice, and affords an instance of this form of ophthalmia occurring in both eyes.

CASE.—J. G., a young man from the country, was attacked with a disease of both eyes, about a fortnight before I saw him. The right eye began first. In addition to the usual inflammatory state of the palpebræ and conjunctiva, the cornea in both eyes was vascular around the margin and opaque throughout, but not ulcerated; and he was unable to discover any object with either. The discharge, which was at first very thick and in considerable quantity, had now become watery and less in amount. The vascularity of the conjunctiva was of a pale-red colour; the pain, which had been very severe at first, was much abated; he had likewise a gonorrhœal discharge from the urethra; in other respects he was quite healthy; some leeches had been applied, and an evaporating lotion used, on the recommendation of a medical man. This was the only treatment hitherto adopted. I applied the nitrate of silver daily during the first week, and he was ordered to use a solution of sulphate of copper, and to take a purgative occasionally. At the end of the week, the cornea of the left eye had become much clearer, so that he began to distinguish shining and moving objects. At the end of another week, this eye had so much improved that he was able to find his way alone, and the cornea of the right eye was also clearer. The nitrate was now applied every three or four days, and at the end of the sixth week, he returned home, the inflammation having subsided, a slight central opacity of each cornea remaining, but with sufficient vision to enable him to read, or to follow his ordinary employment.

PURULENT OPHTHALMIA OF INFANTS, OR  
OPHTHALMIA NEONATORUM

Purulent ophthalmia is much more frequent in infancy than at any subsequent age; it is, indeed, but rarely met with, either in childhood or adolescence. In infants, it usually commences the second or third day after birth, and commonly attacks both eyes, although I have seen many cases in which only one eye was affected.

The circumstance of the ophthalmia coming on so immediately after the birth of an infant, has led to the supposition that something connected with the process of parturition, *e.g.* some morbid secretion from the vagina of the mother, is the cause of it. But, although the great majority of cases undoubtedly occur immediately after birth, yet I have known many which have not appeared until two, three, or more weeks

after that epoch, and some which did not appear until after a much longer time. And when I state that I have, in one instance, known a child to be attacked by purulent ophthalmia even *before birth*, it will be evident that the disease may arise from a number of causes, one of which may be some such secretion as that alluded to, and another a peculiar congenital predisposition.

*Congenital Ophthalmia.*—This extraordinary case I will state a little in detail, since, as far as I know, there is no similar one on record, although, probably, others must have occasionally occurred.

CASE.—Mrs. T.'s child, when first brought under my notice, was six months old, and the mother, a very intelligent person, informed me that at the time of birth, his eyes exhibited the same appearances as were now observable. The disease had run through its entire course previously to birth, for, according to her account, there was no puriform discharge, inflammation, or intolerance of light, noticed at any time subsequently. The cornea of one eye had completely sloughed, the eye-ball had sunk, and, of course, not the slightest vision existed. More than one half of the cornea of the other eye was opaque; through the remaining transparent portion a part of the pupil could be discerned, and the iris and cornea appeared almost in contact. The transparency gradually extended, and more of the pupil became accessible to light; thence, though vision was very imperfect when I last saw the child, yet it appeared to be gradually improving.

Now, after duly considering how perfectly the phenomena presented by the eyes of this child agree with those met with as results of purulent ophthalmia attacking infants after birth, I think that no reasonable doubt can be entertained that they were occasioned by purulent ophthalmia which occurred before birth.

*Congenital Dropsy of the Anterior Chamber.*—This is not the only case that I have met with, affording evidence of active disease of the eyes having been present during the uterine period of existence.

CASE.—Some few years ago I saw a child, then only two or three days old, the cornea of each of whose eyes was opaque throughout and unusually large and prominent, so that very little of the sclerotica was discernible. The opacity was of a bluish-white colour; there was scarcely any irritation about either eye; nothing like inflammation. I merely prescribed some palliative remedies, regarding the case as one of malformation, and thinking that this would probably be permanent. This child, however, when about two years of age, was

again brought to me on account of some slight inflammatory condition of the eyes, and I was surprised to find that they had assumed a perfectly healthy appearance, the cornea having become quite transparent and of the normal size.

This last case was an example of what is usually described as congenital dropsy of the anterior chamber. Similar cases have been recorded by Juengken, Ware, and others, although they are of extremely rare occurrence.

In the "Medical Communications," published in 1790, vol. ii., page 463, three examples of a similar affection are furnished by Mr. Farar, all of which were noticed in one family. The cases being somewhat interesting, rather briefly detailed, and perhaps not easily accessible to some, I will quote Mr. Farar's own account:—

**Cases.**—About nine years since, I was desired to see a child who was about a month old, and apparently blind, having the cornea of both eyes opaque, so that not the least of the iris was to be seen. My opinion was, that nothing could be done in this case, and that the child would for ever be blind. About a month afterwards, the parents informed me there was some alteration in the child's eyes, and requested I would examine them again. I then perceived the opacity to be so much lessened, that I could faintly discern the iris. In two months more the child could perceive light, and from that period the sight progressively increased, and before it was ten months old the recovery was complete. About three years after, another child was born of the same parents, with exactly the same appearance. Having seen the progress of the first case, I concluded that in this the event would be nearly the same; and, indeed, so it happened, in much about the same space of time. The manner in which the cornea acquired its transparency, was, in these cases, remarkably curious; the external edge first growing thin, soon after became clear and transparent, and after this manner the whole surface of the cornea brightened up, the centre being the last spot that recovered its transparency.

Two years ago the same persons had a third child born with the same appearances, except that the opaque part seemed thicker, and that a short round ligament, about three-eighths of an inch long, and of the thickness of a probe, arose from the inner part of the upper eyelid, was attached to the inferior edge of the cornea, and, when the eyelid lifted up, acted in some measure like an additional muscle, by partly raising the globe of the eye. The ligament soon began to waste, and in about three weeks quite vanished.

From having seen the two preceding instances of sight restored, and from the disappearance of the ligament, I thought the opacity of the cornea in this child too would soon begin to give way; but in this I was deceived, a whole year having elapsed before the smallest alteration took place. At the end of a year,



the child seemed to be much diverted by passing its hand perpetually, with the fingers extended, before its eyes, and this has been its constant amusement from that time. The opacity has slowly diminished, but much of it yet remains. The child is now two years of age, but as it can find its way about the house, and distinguishes colours and different objects by holding its head in a particular direction, I think in time the opacity will entirely disappear.

These cases then appear unquestionably to prove that purulent, or some analogous form of ophthalmia, occasionally attacks the eyes even before birth. Similar cases have been reported in the medical journals since the subject was brought forward in my lectures, published in *THE LANCET*, 1839-40, all tending to prove the correctness of my views on this point.

*Causes.*—The purulent ophthalmia of infants, as I have already intimated, is by some authors supposed to be caused by some morbid secretion from the vaginal mucous membrane coming in contact with the mucous membrane of the eyes. Others, again, have attributed it to the first exposure of the eyes to light; or, again, to a want of care in the management of an infant, such as leaving it for some time wet and cold, as is often done in the hurry of a lying-in chamber, particularly in poor families, amongst whom this complaint is especially prevalent.

It is not unlikely that each of these causes may occasionally aid in exciting purulent ophthalmia in infants. I have known many instances, where there has not been the slightest reason afforded for supposing that they ought to be attributed to any preternatural discharge from the vagina of the mother; and, on the other hand, I have met with some of the more severe and rapidly destructive cases in infants, whose respective mothers, at the time of delivery, were, or had been shortly before, infected with gonorrhœa. From this latter experience it is probable that gonorrhœal ophthalmia, as well in infants as in adults, is usually somewhat more virulent and more rapid in its progress than that form which arises from other causes.

Not only may infantile purulent ophthalmia be induced by gonorrhœal matter, but the matter secreted by the eye in the purulent ophthalmia of infants will also induce the same disease in other individuals. I have already referred, in a previous page, to the case of an infant, who lost both eyes, from whom the disease was communicated to a female who had charge of it, and who also lost both eyes. Hence it is obviously

proper that the contagious nature of this affection should be pointed out to such persons as have the management of infants affected with this disease. I may further remark, by way of caution, that it has not unfrequently happened that medical practitioners, when injecting purulent eyes, have had the matter propelled into their own, and thus had the disease induced.

This affection is more commonly met with in delicate infants, and such as are of premature birth, than in those who are more robust, and as I have said, it is more frequently observed in the children of the poorer classes, particularly in such as evince a want of cleanliness, although others are far from being exempt.

Some infants exhibit symptoms of constitutional irritation, and become very much reduced after a severe attack; they are restless, sleep but little, and have their bowels much deranged. On the contrary, I have seen others totally blinded by an attack, without manifesting any disturbance of the general health.

*Progress.*—Purulent ophthalmia in infants, often commences in an insidious manner, and proceeds more slowly than the same affection in adults. In such a case, there appears to be at first but little the matter; the eyelids are somewhat swollen, some purulent-looking matter escapes from between them, and, after the child has been asleep, the margins are adherent to each other from portions of the matter having become hardened. The mother or nurse probably states, that the child has a "cold" in the eyes, and that she has bathed them with a little milk and water, or dropped upon them some of her own milk, and considers the affection of slight importance. No doubt, many cases are unimportant, and there can be no danger so long as the disease is confined to the conjunctiva and palpebræ; nevertheless, they require to be carefully watched, for I have known instances in which the symptoms, after having continued mild for many days, have suddenly changed their character, when the disease has extended to the cornea, and produced ulceration and opacity of it, or infiltration of matter between its lamellæ.

In other instances, severe symptoms are present almost at the commencement of the attack. The disease is of a more aggravated character from the first; there are enormous enlargement of the eyelids and a profuse discharge of muco-purulent fluid, and much difficulty is experi-

enced in obtaining a view of the cornea. Under such circumstances the result is much to be feared.

Usually, however, if we see the case before any extensive mischief to the cornea has occurred, and promptly adopt energetic measures, we may entertain a favourable opinion as to the result, but still it will be judicious to give a guarded prognosis; for, as I before remarked, the disease will sometimes extend to the cornea, even in a somewhat advanced stage, and when there appears but little reason to expect such an occurrence.

*Treatment.*—For the treatment of purulent ophthalmia in infants, we find the same opposite means recommended as for that of the variety affecting adults. The plan of management usually laid down consists in the application of a leech to each superior eyelid, the frequent injection of a solution of alum upon the surface of the eye, and the internal exhibition of some gentle aperient medicine. I have frequently heard it stated by surgeons that with this proceeding they have always succeeded in arresting the progress of the affection; a statement which, I fear, proves only that the opportunities such surgeons have had for observation have been rather limited; for I have witnessed many cases in which such treatment has been zealously employed, and, notwithstanding, destruction of vision has resulted.

Dr. Mackenzie recommends the frequent injection of a solution of one grain of corrosive sublimate, with six grains of sal ammoniac, in eight ounces of water. This solution will be very proper for the purposes of an injection, but cannot be depended upon with a view to higher purposes; and, therefore, Dr. M. further advises that a solution of nitrate of silver, in the proportion of four grains of the nitrate to the ounce of distilled water, be dropped upon the eye once or twice a day; and this treatment he has always found productive of the greatest advantage. If there be a tendency to chemosis, he further recommends the application of a leech or two to the palpebræ, or, instead, the scarification of the conjunctiva.

The identity of this affection with the purulent ophthalmia of adults being admitted, it follows that the same principles of treatment are applicable. My practice invariably is to commence at once with the use of some active stimulant. The nitrate of silver in substance is undoubtedly the most efficacious as well as the most convenient stimulant. I have been in the habit

of using it in these cases for some time past, and I apply it every, or every second, or third day, according to the severity and urgency of the case. In addition, I usually recommend a solution of sulphate of copper, in the proportion of two grains of the sulphate to the ounce of distilled water, to be occasionally injected upon the surface of the eye. The red precipitate ointment also should be applied to the palpebral margins every night, and the internal exhibition of mild laxatives prescribed when necessary.

The treatment just mentioned I have always found to be by far the most satisfactory. It is rare, indeed, that a case ever becomes worse when it is efficiently employed; and I feel confident that if it be resorted to previously to the commencement of ulceration or sloughing, those processes will be rarely witnessed. I do not mean to state, however, that even this treatment is infallible; for ulceration and sloughing of the cornea will sometimes occur, and I consider them to be less manageable and more common in children than in adults. In infants the vital powers are feeble, and the peculiar texture and circulation of the cornea render it very liable, when attacked with inflammation, to fall into the ulcerative and sloughing processes. In some few cases, I have seen these conditions come on in spite of the most energetic treatment, whether general or local, antiphlogistic or stimulant; but, I must say, the consequences have generally been much less serious when the stimulant has been the one employed.

In the advanced stage, the nitrate of silver is the only remedy at all to be depended upon. The advocates of the antiphlogistic treatment commonly recommend in this stage of the affection,—when further evacuations can no longer be thought of, and when the conjunctiva has become pale and relaxed, and the cornea exhibits an ulcerative or sloughy aspect,—the internal administration of the extract of cinchona, or of the sulphate of quinine. This treatment I think decidedly judicious, and either of these substances may be exhibited at the same time that we adopt the local treatment before pointed out. The local treatment, however, is in my opinion chiefly to be depended upon; to trust to general treatment in any stage of the affection is to voluntarily deceive ourselves.

In the progress of the purulent ophthalmia of infants, it is common to meet with a more considerable degree of eversion of the lids than in that

of adults. It was formerly the custom, when this eversion occurred, to excise a portion of the loose conjunctiva, and then, after replacing the lid in its natural situation, to endeavour to secure it there by means of a compress kept on by straps of adhesive plaster or a bandage. There is, however, no necessity for any such operation, for it is always found that, as the diseased action subsides, both the tumefaction and the eversion of the lids disappear. The cure will be best promoted by the adoption and steady continuance of the treatment before indicated. Indeed, eversion is but rarely witnessed, if the treatment have been properly conducted in the outset and during the progress of the disease.

In the purulent ophthalmia of adults, I before stated that it scarcely ever or never happens that any of the internal textures are affected. In the variety now under consideration, on the other hand, such is sometimes the case, at least so far as regards the capsule of the crystalline; for I have often noticed after a rather severe attack of the disease that partial opacity of this texture has occurred. Usually the opacity is very limited, does not exceed a pin's head in size and is sometimes less, and is generally round. Sometimes there are two or three of these spots, which resemble little stars in the pupil, and constitute a condition of the capsule which has been denominated *cataracta stellata*. They, however, according to my experience, do not greatly interfere with vision, although they are generally permanent.

The ordinary terminations of severe attacks of the purulent ophthalmia of infants are by opacity, ulceration, and sloughing of the cornea, staphyloma, atrophy, and general enlargement of the eye-ball. I have never seen anything like suppuration of the globe in the progress of the disease, but Mr. Middlemore speaks of making an incision into the eye in some of these cases for the purpose of evacuating its contents,—a proceeding which I have never had occasion to resort to, and which my own experience leads me to consider as unnecessary.

Before quitting the subject of purulent ophthalmia, I would recommend the practitioner never to rest satisfied until he is properly informed of the actual condition of the eye, more particularly of the cornea. In infant this information is sometimes not easily obtained, for the fissure between the eyelids is small, and frequently the lids are tense, generally very much swollen, and often slippery from the matter which is constantly

running over them ; occasionally, also, when he has managed to separate them, there is still considerable difficulty in obtaining a view of the cornea, from the quantity of matter diffused over it, and if the matter be washed away by injections, the irritation thus occasioned causes the child to cry so much, and to use such long-continued spasmodic efforts, as to prevent him, without using some dexterity, from obtaining the desired view. Sometimes, too, the substance of the lids is so much swollen that by his efforts to separate them he will cause their conjunctival surface to become everted, and be unable to obtain a view of the cornea. There are, therefore, frequently considerable difficulties to be surmounted before a satisfactory view of the cornea can be obtained, but these may generally be surmounted by due management and patience. In such cases as are found to be unmanageable, as regards the point under notice, we must be careful to give a guarded prognosis ; for I have known many instances, in which medical men, without having obtained a view of the eye-ball, have confidently predicted the recovery of sight after an attack of ophthalmia neonatorum ; and yet, on a proper inspection being made, the eyes have been found in a state of sloughing, or of irremediable ulceration or opacity. Such false prognoses, it is needless to say, have a tendency to injure the reputation of any surgeon who may give them.

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## SECTION V.

### PUSTULAR OPHTHALMIA, OR CONJUNCTIVITIS PUSTULOSA.

Pustular or aphthous ophthalmia differs but little from that variety of conjunctivitis which we first described under the term simple ophthalmia.

*Diagnostic Symptoms.*—Its characteristic peculiarity consists in the existence of one or more pustular elevations on the surface of the conjunctiva. The pustules are variously situated, but most commonly they are observed on the sclerotic, less frequently on the corneal, and only occasionally on the palpebral, portion of the conjunctiva ; sometimes they appear simultaneously on each of these portions, but oftener on one of them exclusively. The most common situation, as I have said, is the sclerotic portion of the conjunctiva, and most frequently that part of it surrounding the margin of the cornea. Sometimes, but a single pustule is observable ; at others a cluster of them may be noticed, completely

encircling the cornea, and causing it to appear, as Mr. Middlemore remarks, "as though it were set with pearls."

The size, also, of the pustules is variable, and usually depends upon their number. If only one is present, it is apt to be of a considerable size; if several, they are usually smaller.

The pustules usually contain a quantity of lymph, and hence they present a whitish appearance. The fluid portion either escapes by ulceration or becomes absorbed. When they are very small they appear to contain merely a little watery fluid, and are then termed *pMycetulus*.

Pustular ophthalmia, when confined to the conjunctiva scleroticæ, is usually a very trifling, unimportant disease, even though the pustules ulcerate; but, when the pustules are situated on the conjunctival surface of the cornea, and more especially if they ulcerate, vision may be considerably endangered. The danger arises from two circumstances: the first is, that an ulcer, although evidently commencing on the outer surface of the cornea, is exceedingly apt to perforate its entire laminae, and penetrate the anterior chamber, and thus may so interfere with the internal textures of the eye as to destroy vision; secondly, an ulcer, although superficial, and confined to the outer layers of the cornea, may, by reason of the opacity which frequently remains after the healing process is completed, particularly if it occupy a central position, so interfere with vision as to render the eye useless. In some instances, however, pustules on the cornea are removed by absorption, and then there is less chance of an opacity remaining; and occasionally it happens that, notwithstanding the formation of an ulcer, the cornea heals without any opacity, or, at least, with only such opacity as speedily disappears.

There is always more or less vascularity attendant upon pustular conjunctivitis. When there is but a single pustule present, the vascularity is usually partial, and the vessels run in *fasciculi*; when there are several, the vessels are more numerous, indeed general, and have a *reticulated* appearance.

From the unevenness and irregularity of the surface occasioned by the vascular condition of the conjunctiva, and more particularly by the elevated pustules, there is usually some irritation or uneasiness felt in the eye, similar to that caused by the presence of a foreign body; the uneasiness, however, but seldom amounts to pain. There is but rarely any great intolerance of light from pustular ophthalmia, excepting when it

occurs in strumous individuals. The lachrymation, also, is usually not very considerable.

Pustular ophthalmia, though more common in children and young persons, is very frequently met with in middle-aged people. From the circumstance that children of strumous constitutions are very liable to it, some writers have gone almost so far as to consider pustular as synonymous with strumous ophthalmia. It is quite certain, however, that pustular conjunctivitis is occasionally met with in individuals who are perfectly exempt from the strumous diathesis; and I would recommend the practitioner to be especially careful, when he meets with a case of it, not to give utterance to any opinion that shall be likely to wound the feelings of the patient, by unnecessarily or improperly bringing in question his physical character. Every surgeon, too, who has seen much of the ophthalmia of strumous subjects, must be quite aware that in very many cases there is not the least appearance either of pustules or phlyctenulae.

The conjunctiva may, to a certain extent, be regarded not merely as a mucous membrane, but likewise as a portion of the cutaneous system, and hence we may be led to infer that its diseases will, in some respects, resemble those of the cutaneous system, as well as those of mucous membranes. The form of the ophthalmia now under consideration may be looked upon as of this mixed character, for persons who possess a delicate and an irritable skin, and who are liable to various cutaneous affections, are frequently attacked with pustular ophthalmia. The pustules which are developed on the conjunctiva are not, however, precisely like those which occur on the skin, since the two textures, though analogous, are not identical.

The resemblance between the structure of the conjunctiva and that of the skin, and also the circumstance of those structures being directly continuous, render the former of them very liable to suffer when the latter is affected with disease. And in this way, viz., by extension of some disease of the cutaneous system to the conjunctiva, we have not merely pustular ophthalmia excited, but likewise a number of sympathetic ophthalmia, which possess no distinctive characters besides those of one or other of the various forms of conjunctival inflammation before described. These sympathetic affections we shall hereafter have to consider under the various denominations of strumous, variolous, and other ophthalmia.



*Treatment.*—The treatment of pustular ophthalmia is to be conducted on the principles before advocated, as the best for directing that of the other forms of conjunctivitis. I have never seen an example of it which required either general or local bleeding. I always apply the pencil of nitrate of silver lightly to the conjunctival surface of the inferior lid, and if the pustule be unusually large, or ulcerated, I also touch it with the same substance, finely pointed. In addition, I merely recommend a slightly stimulating lotion, and sometimes nothing but tepid water externally. If the margins of the lids are apt to become adherent after sleep, the red precipitate ointment I also prescribe as an application to be used at bed-time. In this manner I nearly fail to arrest the disease at once, when the pustules are confined to the conjunctiva. In those cases where the cornea is also affected, the cure is more protracted; but if adopted early, this treatment, even then, is almost always effectual in removing the disease in a brief period of time. Of course, where the pustule is followed by ulceration, some opacity must occasionally remain. If there be any reason to suspect derangement of the digestive organs, a mild purgative must also be recommended.

*CASE.*—Miss L., æt. six years, a rather delicate but very lively young lady, had, at the time when I was first consulted, considerable conjunctival inflammation of the right eye, which had existed five or six days. Around the margin of the cornea, several pustules of not very large size were observable; there were also some lachrymal discharge, and sufficient intolerance of light to render a shade necessary, and she complained of an uneasy sensation as of sand in the eye. About two months previously she had had a similar attack, for which some saturnine lotion and red precipitate ointment were prescribed by a medical practitioner, and which had very slowly subsided under the use of those remedies. At the time I first saw the patient she had no other ailment, and had never exhibited symptoms of scrofula. Having drawn down and everted the lower lid, I passed the pencil of nitrate of silver lightly and rapidly across its conjunctival surface. In addition, I recommended the applications before prescribed her to be again had recourse to, and an occasional dose of calomel and jalap to be administered internally. On my next visit, two days afterwards, the pustules were no longer visible, and the other symptoms had nearly vanished, only a slight degree of vascularity remained, and the patient had thrown away her shade, which had been previously indispensable. I had occasion again to see her some time afterwards, but no relapse had occurred and no further treatment was necessary.

## SECTION VI.

## ERYSIPELATOUS OPHTHALMIA.

The next and last form of conjunctival inflammation to be considered, is conjunctivitis erysipelatosa, or erysipelatoous ophthalmia.

*Diagnostic Symptoms.*—It is a well-known fact that erysipelatoous inflammation is frequently continued from the skin to the conjunctival dermis. Erysipelatoous ophthalmia, however, is occasionally met with as an idiopathic affection, and is indicated by an increased vascularity of the conjunctiva, which is of a much *paler red* than in other forms of conjunctivitis; but its distinctive characteristic consists in a *watery effusion into the cellular tissue* lying between the conjunctiva and sclerótica. Sometimes the effusion is partial, as exhibited by the appearance of *vesicles* or *bullæ*; at others, it is general, the conjunctiva being elevated from the surface of the sclerótica, and much distended with the effused fluid, giving to the eye a peculiar watery aspect.

The elevation and distension of the conjunctiva, to which I have just alluded, are sometimes so great as to cause the margin of the cornea to be completely overlapped, as in chemosis. Indeed, the condition of the conjunctiva frequently strongly resembles that of chemosis, excepting that the amount of vascularity of the membrane is very inconsiderable, compared with the bulging of it.

In erysipelatoous ophthalmia there are usually some intolerance of light, lachrymation, and pricking sensation in the eye complained of; but these symptoms are seldom very strongly marked. The tarsal margins are often noticed to become adherent, from the altered character of the secretions; and occasionally there is inflammation of the palpebræ existing, as denoted by redness and œdema.

Erysipelatoous ophthalmia, when an idiopathic affection, according to my experience, is frequently induced by external causes of irritation, such as foreign bodies propelled against the surface of the eye, particularly when in a state of great heat, explosion of inflammable materials, and the like. But I am satisfied that it is sometimes excited merely by exposure to cold, or the other ordinary causes of ophthalmia.

*Treatment.*—The treatment of erysipelatoous ophthalmia is to be conducted on the same principles as that of ordinary erysipelatoous inflamma-

tion, for which nitrate of silver is now generally admitted to be the best local application, and there can be no doubt that it is the most effectual local remedy for this affection of the conjunctiva. Mr. Higginbottom, the author of a valuable work on the use of nitrate of silver, recommends the application of this substance to the outer surface of the palpebræ. This mode of applying nitrate of silver has also recently been advocated by Mr. Wormald and Dr. Hocken, in the treatment of some forms of ophthalmia. Dr. Furnivall, of Hertford, has also recently advised the application of tincture of iodine to the external surface of the lids, as a remedy in the treatment of the milder forms of ophthalmia. This would be very proper if we could not obtain access to their conjunctival surface; but as this can always be accomplished without difficulty, it is obviously the part to which the remedy is to be applied.

The nitrate of silver may be applied either in substance or solution according to the intensity of the attack. In addition, the red precipitate ointment may be applied to the margins of the lids at bed-time. Sedative substances, externally applied, may, in some cases, be useful, such as the decoction of poppies, or the saturnine lotion.

As there is, in most cases of erysipelatous ophthalmia, some constitutional disturbance present, particularly when the attack is the result of extension from the cutaneous surface, we must be careful to prescribe suitable internal remedies; these, in the first instance, should be such as act freely upon the alimentary canal, and they should be followed, without much loss of time, by the exhibition of tonics, more particularly the quinine.

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## SECTION VII.

### STRUMOUS OPHTHALMIA.

It has been before observed that there are several morbid conditions of the eye, which are found to result from some other disease situated on the cutaneous surface of the body; such are those termed strumous ophthalmia, variolous ophthalmia, &c.

The eye, when inflammation has been excited in it by strumous or variolous disease, offers nothing peculiar to our notice; the conjunctiva is always affected merely with one or other of the forms of inflammation before described. Nor, indeed, is there any particular difference of

treatment necessary, especially as regards the local treatment of the organ. Nevertheless, there are so many points worthy of attention connected with ophthalmia from these causes, as render it desirable that it should be discussed separately from the others. I shall begin with the consideration of strumous ophthalmia, or, more properly speaking, the *ophthalmia of strumous subjects*.

Conjunctival inflammation, when occurring in children and young persons, is apt to be indiscriminately, and, therefore, often improperly, regarded as connected with the strumous diathesis. We are told by various authorities, that ninety in every one hundred cases of ophthalmia in children are of this character. I am inclined to think that this is an exaggerated statement, and is, probably, true only of the poorer classes of society. There can be no doubt, however, of the extensive prevalence of struma, and of the ophthalmic affection which it originates.

*Strumous Diathesis.*—An individual affected with strumous disease usually presents some of the following characteristics:—There is a tumid condition of the upper lip and nose, the integuments of the face generally have a puffy appearance, and some of the glands of the neck and face are either hard and enlarged or in a state of suppuration. The abdomen, too, is frequently tumid, from enlargement of the mesenteric glands. The skin of the face, and sometimes of the whole head, particularly in young children, is also frequently the seat of an extensive eruptive disease, which covers it as with a mask, hence called *porrigo larvalis*, or, from the matter collecting on the surface and forming a scab or crust, it is designated *crusta lactea*. In children of more advanced age, the joints are frequently the seat of chronic inflammation, and this may be followed by enlargement, ulceration, and suppuration. In more aggravated cases the bones and lungs are also affected.

Sometimes, however, the scrofulous diathesis evinces itself in a less striking manner. The child is what is called “very delicate,” has a remarkably fair skin, very light hair and eyes, and is frequently liable to slight eruptions about the nose, ears, and lips, and occasionally some swelling of the glands about the neck.

Individuals affected in the manner just described are said to possess a strumous diathesis. This condition of the system is most frequently observed in children and young persons; it is but rarely developed in

infancy, and commonly declines after puberty. It is generally admitted to be hereditary.

In persons of a scrofulous diathesis, whether the disease shall continue to be dormant in the system or be roused into activity, greatly depends upon circumstances; for poor living, deficient clothing, dirty habits, exposure to cold and damp atmosphere, all favour the development of it. A northern climate, particularly where cold and moisture prevail, as in this country and the north of Germany, is also considered to operate in a similar way, the disease being comparatively scarce in the warmer and drier regions of Italy and the south of Europe. Hence, those individuals who can command the comforts and luxuries of civilized life, and, at the same time, have the prudence not to abuse them, have a much better chance of passing through the period of life most obnoxious to scrofula, without falling a prey to its ravages. On the other hand, the children of the poor, who are too frequently half starved and in want of almost every comfort, are most liable to fall victims to it, sometimes escaping with the loss of a limb or an eye, or being otherwise maimed or disfigured.

*Extension to the Conjunctiva.*—The system being impregnated with strumous disease, it frequently happens that the conjunctiva participates in the morbid action, and, after this occurrence, it is apt to decline in the structures previously affected; and, very often, there is an alternation, the eyes improving and the other parts getting worse again. As there are but few other structures that are liable to it of so much importance as the eye, it is necessary to be somewhat cautious in repelling the disease when affecting contiguous parts, lest it should be diverted to that organ; indeed, it is common for persons whose children are affected with eruptions about the face, ears, &c., to express their fears that by removing them they may endanger the healthy condition of the eyes, and no doubt with much reason. The notion, too, extensively prevails, that sores about the ears, and wearing ear-rings, are excellent preservatives for the eyes.

I wish it to be clearly understood, however, that I am not one of those who consider every ophthalmic case occurring in children, in connection with eruptive disease, as of strumous origin. Nevertheless, I cannot agree with the writers who describe such an affection as a separate disease, and deserving of a distinct appellation, since it is still conjunctival inflammation, whether combined with struma or otherwise. Hence I regard the

proposition of Mr. Wardrop and others, to bestow the terms *exanthematous* and *porriginous ophthalmia*, as objectionable.

I have already stated, that when the conjunctiva becomes affected in strumous individuals, there is nothing in the appearance of the eye that is not occasionally observed in individuals of a sound constitution, when accidentally suffering from conjunctivitis. We may have the same phenomena exhibited as in the simple, catarrhal, purulent, pustular, or erysipelatous form of conjunctivitis. The pustular, however, is undoubtedly the most common variety witnessed; but still we, occasionally, meet with each of the others.

*Diagnostic Symptoms.*—But there are some peculiarities in the symptoms observed during an attack of strumous ophthalmia which I proceed to point out. One peculiarity is an *excessive intolerance of light*. This is often the most striking, as well as the most annoying, symptom; it is so much more intense than in ordinary conjunctivitis, as frequently to justify the term *photophobia*, which has been applied to it. This term is by no means too strong for very many cases, so great is the dread of light which is experienced. Very often there is no sort of direct correspondence between the intensity of this symptom and the amount of vascularity of the conjunctiva, for in many instances the inflammation is but trifling while the intolerance of light is excessive; so great, indeed, that the patient suffers dreadfully if he be in a room that is only moderately illuminated.

When intolerance of light is present in this extreme degree, the action of the orbicularis muscle, which, by bringing the lids into contact, endeavours to prevent the access of light, is often so violent that it is difficult to separate them so as to obtain a view of the eye. This state of the lids is technically named *blepharospasmus*. No doubt this excessive action of the orbicularis, by forcibly squeezing the palpebral against the ocular portion of the conjunctiva, when in this inflamed and irritable condition, must be productive of considerable suffering to the patient: at other times, there is not much pain complained of in the eye.

This morbid sensibility to light is thought, by most authors, to arise from a sympathetic affection of the retina. Some, indeed, appear to think that there is very frequently *retinitis* present in the severer cases of strumous ophthalmia. I cannot accede to the views entertained by these writers, because we have no proof whatever that such conditions of the

retina exist in these cases any more than we have that they exist in a case of simple conjunctivitis from injury. In short, as Dr. Mackenzie remarks, "Strumous ophthalmia excites very much the same train of effects which follow the irritation of a particle of dust on the inside of the upper lid;" and there is just as much reason for saying that the retina is affected in the latter case as in the former. That the diseased action may, in some rare instances, extend to the internal textures and involve the retina is quite likely; such extension, however, is by no means common.

My own opinion is, that sensibility to light, whether healthy or morbid, is to be referred to the fifth pair of nerves rather than to the retina. The retina I regard as simply the recipient of visual impressions. This is a subject which it would be obviously improper to enter upon here in detail; but I may relate a case which is interesting in a practical point of view, and will serve to illustrate the distinction I have endeavoured to establish.

CASE.—Mr. C. consulted me in November, 1835, respecting a paralytic affection of the right side of the face. There was a complete absence of feeling on the whole of that side; all power over the muscles was lost, and, therefore, there was inability to close the eyelids, and the mouth was twisted to the opposite side; taste also was very much impaired. Both eyes were, to all appearance, perfectly healthy, there being merely an inability to close the lids of the right. Now, here was a case in which the fifth nerve on the affected side was evidently paralysed, whilst the retina and optic nerve were clearly intact, for vision was perfect in both eyes. With a view of putting my supposition as to the seat of sensibility to light to the test, I placed the patient before a very brilliant flame from a gas burner. The effect was very striking, for the left eye could not bear for a single instant the exposure to so vivid a light, whilst the opposite eye, (that of the paralysed side,) when placed close to it, was *completely insensible to its irritating influence*. He was treated on the combined antiphlogistic and mercurial plan, and speedily recovered. It was interesting to observe, that as common sensibility was restored, the eye became again susceptible of the irritating influence of light.

*Lachrymation.*—The lachrymation attendant upon strumous is usually more considerable than is noticed in other forms of ophthalmia. Sometimes, particularly during the forcible separation of the lids in children, there is literally a gush of a clear, watery fluid, and this fluid is usually thought to possess very irritating qualities, and to produce the *excoriation of the integuments of the face*, so common in strumous children.

The cutaneous affection, however, is generally a part of the strumous disease, but it is quite likely that it is much increased by the contact of the irritating lachrymal fluid.

*Extension to the Cornea, Sclerotica, and Iris.*—I have said, that strumous ophthalmia is an affection of the conjunctiva. Certainly, in slight cases, the conjunctiva alone exhibits marks of inflammatory action, yet, in such as are protracted and severe, the cornea and sclerotica, more particularly the former, are sure to become more or less implicated.

The cornea may be variously affected, either by simple vascularity, or, more commonly, ulceration and opacity. When the sclerotica is affected, the vessels of that texture are seen underneath those of the conjunctiva, sometimes rather numerous, fine, and radiated, and having a pink colour; at other times, fewer, larger, and more tortuous, and having a purplish tint, more particularly in chronic cases. Occasionally, the inflammation is extended to the iris and the deeper-seated textures, but that is unusual.

*Exciting Causes.*—In a strumous individual, ophthalmia is easily excited, particularly by variations of temperature, by teething, by an attack of measles, or other exanthematous or cutaneous affection.

*Treatment.*—The treatment of strumous ophthalmia must be spoken of with reference, first, to the *diseased organ*, and, secondly, to the *general strumous disorder*.

The young practitioner, whose experience must be presumed to be somewhat limited, when his attention is directed to a case of strumous ophthalmia, noting the vascular condition of the conjunctiva, the extreme intolerance of light, the frequent gushing of tears, and the other symptoms ordinarily present, is apt immediately to conclude, that he must call in, to aid him in combating the inflammatory condition he observes, the usual antiphlogistic remedies, viz.—leeches, blisters, emetics, purgatives, and the like. He may have been taught that these are the only means of arresting the inflammation, and that to attempt its removal otherwise would be at least futile, and possibly mischievous.

*Local Treatment.*—In the previous pages I have more than once expressed my opinion, founded on experience, as it is, that conjunctival inflammation is best treated by local stimulants. If that treatment be applicable to ordinary conjunctivitis, how much more must it be thus applicable when conjunctivitis occurs in an individual of a strumous constitution.



Strumous ophthalmia is almost always a very intractable disease, more especially when treated by the ordinary antiphlogistic remedies. I do not mean to deny that it will sometimes yield to the application of leeches, blisters, and similar remedies. In many instances, however, these means are of no use at all, and sometimes they appear to be decidedly injurious.

There are but few authors who do not recommend the antiphlogistic treatment at the outset of the complaint. Even Dr. Mackenzie, who is less disposed to bleed in conjunctival inflammation than most of his contemporaries, considers, that "if the constitution is not as yet impaired by long continuance of the disease, and the employment of many debilitating remedies, repeated recourses must be had to the use of leeches, so long as the redness of the conjunctiva is considerable, and the intolerance of light acute." He subsequently states that "by depletion alone no case of this disease can ever be cured. On the contrary, repeated bleedings, without the use of other remedies, reduce too much the general strength, and render the eye more susceptible of destructive changes." The other remedies which he advises are purgatives, emetics, and nauseants in the first instance; and, subsequently, sulphate of quina, mercury, antacids, and local stimulants. In short, the view taken by Dr. Mackenzie appears to be, that in the early and acute stage antiphlogistic remedies are to be employed, and that stimulants are to be resorted to when the chronic stage has arrived. In this it will be found he differs but little, if at all, from most other writers.

I differ in opinion from those who inculcate the necessity of antiphlogistic treatment in the ophthalmia of strumous subjects. I am not aware that any good effects, which may not be obtained by other means, can result from its adoption. Strumous ophthalmia, according to my experience, always more readily yields to the stimulant treatment, when properly employed, than it does to the antiphlogistic. I make this observation as definitely applicable and true, whether the disease be in the acute or chronic stage; whether it be more or less intense; whether it be confined to the conjunctiva, or have extended to the cornea, or even to the sclerotica; the principle in all these cases is still the same, viz., the necessity to use stimulants. But the stimulants to be employed must be selected in accordance with the severity of the attack. If the attack be

slight, then the milder stimulants will be sufficient, such, for example, as the sulphate of zinc solution and the zinc ointment; if somewhat more severe, the sulphate of copper solution and the red precipitate ointment; if very active, the sulphate of copper in substance; or the nitrate of silver, either in solution, ointment, or substance.

In the treatment of this affection it often happens that the more powerful the application the better the success; while, on the other hand, the milder stimulants sometimes appear only to irritate, not to destroy the morbid action. In an acute case, I should generally prefer the pencil of nitrate of silver applied directly, but lightly to the conjunctival surface; whereas, in one of a less intense character, I should probably use the sulphate of copper in substance, as well as some of the other stimulants before mentioned.

In very irritable subjects, sedatives may be often alternated with advantage, *e.g.*, warm water, poppy fomentation, saturnine lotion in a tepid state, or a solution of the extract of belladonna. The last, more particularly, is often productive of great relief where the eyes are excessively intolerant of light. In its effects on the iris we have indubitable evidence that it acts immediately, and in a peculiar manner, on the nervous system of the eye. The liquor opii sedativus, in the proportion of a drachm to an ounce of water, is also highly extolled by some surgeons as a local application.

Counter-irritation, by means of blisters, setons, or issues, I scarcely ever resort to. Blisters, more particularly, when applied behind the ears, are very apt to be followed by many disagreeable results; they almost invariably excite inflammation and suppuration of the neighbouring glands, effects which are the more readily produced, on account of the tendency to disease which exists in them, from the presence of the strumous diathesis. The use of an issue or seton is strongly urged by many practitioners. Rowley quaintly remarks of these remedies, "Those who have had inflamed eyes many years, we most commonly find with either seton, or issue: from this circumstance, it plainly appears they do not effect a cure."

Shading the eyes with a piece of pasteboard, lined with green or blue silk, and fastened lightly round the head, is very proper when the intolerance of light is considerable; but, so soon as this symptom is mitigated, the shade should be dispensed with. The eyes should be accu-

tomed, whenever practicable, to their natural stimulus. Handkerchiefs, or other substances which retain heat, should be entirely prohibited from being placed around the head and face. An injurious effect is often produced by permitting the head to be covered over with a too great quantity of hair. Parents are usually afraid of cutting it when their children's eyes are inflamed, for fear of some mischievous result. When I observe this I always direct the removal of a considerable quantity, and generally with very good effect.

**CASE.**—Mrs. C. consulted me about her little girl, five years of age, who was suffering from an affection of both eyes, which had existed for six months. She was a delicate child, exhibiting the usual appearances of strumous disease, more particularly now, however, seated in the eyes. On examination, the conjunctiva was found to be vascular, and there were many pink vessels also discernible on the surface of the sclerotica; the cornea had several opaque spots upon its outer layer, and there were several phlyctenulæ around its margin, but the disease had not extended to the iris. There was, likewise, a considerable flow of tears, particularly on attempting to separate the lids, and the dread of light was extreme. This last symptom was so intense, that the mother assured me that the child had not once exposed the eyes to light during the last three months, and she was fully persuaded that vision was destroyed. The examination I had made, of course, enabled me to satisfy her to the contrary. The child had been under the care of a surgeon, who had repeatedly ordered leeches, blisters, and other remedies, which had not alleviated the symptoms in the least degree. Having exposed the conjunctival surface of the lids, I applied the nitrate of silver in the usual way. I also prescribed the saturnine lotion to be applied externally, and the red precipitate ointment to the tarsal margins, with a dose of calomel and jalap every second or third morning. In three or four days the patient began to open her eyes, at first timidly and by glances, but afterwards very freely, and, to the great satisfaction of her friends, she could clearly discern every object. After fourteen days, without any further application of the nitrate of silver, and using only the other means I have mentioned, all the inflammatory symptoms had disappeared, and no vestige of the disease, except the opacities, remained. These last were not so situated as to obscure vision, and they became materially diminished after a short time.

I could offer many other cases in which this treatment was productive of the same striking benefit. I do not pretend, however, that every case will yield to it with the same rapidity as this one. A great many will; but there are some, and these more particularly occur among the children of the poorest classes, in which it is necessary to apply the nitrate many

times, although it is rare indeed to find that it does not produce a decided change for the better almost immediately.

In the management of these more obstinate and protracted cases, I must repeat the caution I formerly gave, as to the excessive employment of the nitrate of silver. If employed a great many times, it may produce more ulceration of the conjunctival surface than will be agreeable; and, therefore, as soon as the symptoms improve, we may properly substitute the sulphate of copper for the nitrate of silver. But I would observe that I am not one of those fastidious practitioners who would rather permit vision to be destroyed than run any risk of producing an unimportant change in the structure and appearance of the conjunctiva.

*General Treatment.*—In addition, then, to that of the organ itself, the attention of the practitioner must be directed to the state of the general system, upon which the local affection depends. It would be a very serious error, however, to suppose that the local disease is to be treated by such means only as operate upon the constitution at large, since many an eye would be certainly lost but for the energetic employment of local means. On the other hand, the tendency to a restoration of the functions of the visual organ will be often much increased by the judicious administration of remedies, which act upon the general system; and the disposition to renewed attacks of the ophthalmic affection will likewise be diminished by the same means.

It may be stated, generally, that all modes of treatment that have the effect of lowering the vital powers must have a direct tendency to aggravate strumous disease. If this view be correct,—and that it is so hardly admits of doubt, since we find that debilitated constitutions are most obnoxious to such disease,—we at once infer the impropriety of adopting many of the means ordinarily recommended for subduing strumous ophthalmia, such as bleeding, mercury, emetics, strong purgatives, &c. This treatment, I am satisfied, is both unnecessary and improper.

The internal treatment should be such as is calculated to increase the energies of the system. The various medicinal agents known under the appellation of tonics, such as the mineral acids, chalybeate preparations, and more particularly quinine, can alone be expected to be productive of benefit. Perhaps the sulphate of quina is the best; it may be given in doses of half a grain or a grain, with a little sugar, to children three or four times a day.

Iodine is thought by some practitioners to possess properties which render it useful in the treatment of struma, and particularly of glandular enlargement. In such cases, it often produces very decided benefit; but I very much doubt if it has any control over the affections of the eye, although M. Lugol has expressed himself very strongly to the contrary. The formula recommended by Lugol is the following :—

*Hydriodate of Potash, one drachm ;*  
*Iodine, three grains :*  
*Water, three fluid ounces.*

The dose is half a teaspoonful three times a day, for children. For the enlargement of the glands, the following liniment is recommended :—

*Hydriodate of Potash, one scruple ;*  
*Lard, one drachm.*

M. Dupuytren, who was averse to the use of antiphlogistic remedies appears to have placed the greatest reliance upon the internal administration of belladonna in the treatment of strumous ophthalmia; and Mr. Middlemore states that Professor Koreff assures him, that he has witnessed the most surprising benefit from the internal administration of the same remedy.

Removal to a marine residence and salt-water bathing are found to be highly beneficial, particularly as restoratives after the ophthalmic affection has subsided. An artificial sea-water bath is to be advised when circumstances prevent bathing in the sea. The cold bath is usually to be preferred, but if the season, or the condition of the patient, should prohibit cold, then the tepid bath is to be employed. Rubbing the body over with a coarse cloth, after the use of the bath, is usually considered to have a beneficial influence.

In strumous subjects, warm clothing and nutritious diet are of great importance. A due mixture of animal and vegetable food, with a moderate allowance of malt liquor or wine, is always to be advised, except where the stomach is obviously deranged. In this case, substances which are liable to fermentation, should be administered rather sparingly and the morbid condition of the stomach remedied by the use of antacids such as the carbonate of soda, or the carbonate of ammonia, the latter, in particular, being thought to possess qualities which render it highly valuable in the treatment of strumous disease.

A due attention must be paid to the condition of the alimentary canal. I do not see, however, what is to be gained by frequently exhibiting purgatives. Small doses of calomel, combined with rhubarb or jalap, carbonate of soda with rhubarb, or a suitable draught of infusion of senna, with sulphate of magnesia, may be occasionally ordered.

Notwithstanding all the efforts we may have made, and the success that may have attended those efforts, in so far as the ophthalmic affection is concerned, we must expect that the patient will be liable to occasional relapses; we can never pronounce him free from the danger of a subsequent attack. This should be pointed out, as well as the best means of prevention, which are such as tend to strengthen the constitution, and have been already described.

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## SECTION VIII.

### OPHTHALMIA VARIOLOSA, OR THE OPHTHALMIA RESULTING FROM SMALL-POX.

It has been before stated, that during the progress of the various exanthemata, the inflammatory action is very apt to extend from the cutaneous to the conjunctival surface of the palpebræ.

In such cases we generally find that, in addition to inflammation and swelling of the lids, a certain amount of conjunctivitis is present, either during the existence of the eruption, or after it has begun to decline, as evinced by the redness of the conjunctiva, the intolerance of light, and the mucous discharge which collects upon the tarsal margins, and causes them to adhere. Usually, in variolous cases, the ophthalmia is very slight; and in many the agglutination of the lids is probably caused solely by the matter from the pustules about their margins.

This agglutination of the palpebral margins very often continues for several days during the progress of the variolous affection, and is usually of no importance, although we often find such a condition spoken of by the friends of the patient, as one of actual blindness; in such instances the blindness is merely such as would be occasioned by placing a handkerchief around the eyes.

It is the custom of many writers on ophthalmic surgery to describe the conjunctival membrane as a direct continuation of the outer covering of the body. I have before remarked that although there may be some analogy between the two textures, yet they are by no means identical. If there were the close resemblance these writers appear to imagine, we might very reasonably expect that pustules would generally be found upon the conjunctiva, during an attack of variola. Such, however, is certainly not the case. In a great many cases the eye appears to be altogether exempt, not merely from pustules, but even from active inflammation; and in ordinary cases, where ophthalmia does exist, it is not the pustular, but a much more severe form of ophthalmia, viz., the *catarrhal*, which is observed.

Some authors, indeed, deny that variolous pustules, ever do form on any portion of the conjunctiva. This opinion is entertained by M. Guersent, Dr. Gregory, and Mr. Marson. The contrary opinion, however, is generally considered to be the correct one, either perhaps from want of proper examination, or from taking it for granted that, because there are pustules on the cutaneous surface of the lids, there must also be some on the conjunctiva. The pustules, however, when stated to be present, are usually spoken of as if they never appeared any where but on the surface of the cornea. No author that I have met with ever speaks of variolous pustules on the conjunctiva, either of the globe, or of the palpebræ. This, it must be confessed, is somewhat suspicious, since if it were really pustular ophthalmia that comes on during variola, pustules would be noticed elsewhere besides on the cornea; so that, on the whole, it is very probable that the existence of variolous pustules, on any portion of the surface of the eye, is altogether an assumption, unsupported by facts. I have certainly never seen them myself.

I have said that when ophthalmia is excited during the progress of small-pox, it is the *catarrhal*, and not the pustular variety which is ordinarily seen. I state this from the observation of a few cases which have come under my care; and I have no doubt that, in some of the more severe cases, it is the *purulent* variety which supervenes; that the organ suffers from extension of the inflammatory action to the cornea, occasioning a deposition of lymph between its laminae, or ulceration, or even sloughing of it; and that thus are produced the numerous sunken eyes, staphyloma-

tous projections, and indelible opacities, which are so often met with as sequelæ of small pox.

This view of the character of variolous ophthalmia has been much strengthened by the perusal of a very able practical paper, by Mr. Marson, of the Small-pox Hospital, a gentleman who has evidently paid great attention to this subject. According to Mr. Marson, the proportion, among variolous cases, of those who suffer from a severe attack of ophthalmia, is twenty-six in one thousand, or one in thirty-nine; and of these, eleven lost an eye—about one in one hundred—precisely one and a tenth. “The attack begins, generally on the eleventh or twelfth day, or later, from the first appearance of the eruption, and when the pustules on every other part of the body are subsiding. It comes on after the secondary fever has commenced, with redness and slight pain in the part affected, and very soon an ulcer is formed, having its seat, almost invariably, at the margin of the cornea; this continues to spread with more or less rapidity, according to the degree of secondary fever present; in the more violent cases an ulcer being formed on each side of the cornea at the same time, showing the disease to be advancing with great severity, and presenting a tolerably certain indication that the eye will be entirely lost. The ulceration passes through the different layers of the cornea, until the aqueous humour escapes, extending itself too laterally, and, if the part of the cornea destroyed be large, the iris will protrude through the opening. In the worst cases there is usually hypopion, and when the matter is discharged the crystalline lens and vitreous humour escape; or the humours may escape from deep and extensive sloughing, in the first instance, without the formation of matter, this being succeeded, of course, by the total annihilation of the form of the eye, as well as the sight.” (LANCET, vol. ii. 1838-39, page 235.)

After perusing Mr. Marson's graphic account of the symptoms and progress of this affection, I think but little doubt can be entertained of its being either a severe form of catarrhal, or of purulent ophthalmia, which he has described. The sloughing of the cornea Mr. Marson conceives to be analogous to the same process which is so frequently observed to take place in the cellular membrane in various parts of the body. In the progress of variola, sloughing of the cellular membrane of the scalp, palpebræ, above the beard in men, neck, elbow, and dorsum of the foot, is still more frequently observed than in the cornea. Wherever it occurs, Mr. Marson



justly ascribes the sloughing process to violent inflammation attacking structures of similar character.

*Treatment.*—The treatment of variolous ophthalmia must be regulated altogether by the mildness or severity of the attack. In slight cases, probably some simple unctuous substance, *e. g.*, zinc ointment, applied to the tarsal margins, might operate beneficially in allaying irritation and facilitating their separation. The occasional use of warm water may also be similarly useful.

If it be correct to consider the ophthalmic affection as an extension of the inflammatory condition of the palpebræ, which are always much swollen, and in a state strongly resembling that which attends purulent ophthalmia, it becomes a question whether proper applications to pustules on the lids may not be useful for preventing the extension of the inflammation to the conjunctiva, and thence to the cornea. In cases where pustules form on the tarsal margins, such extension is more likely to happen, and, therefore, they should be early opened with a needle, and then touched with the nitrate of silver pencil. This practice has been recommended by Velpeau, with a view to prevent the deformity which is otherwise apt to result from their ulceration and cicatrisation. But I would advise its adoption on higher grounds, *viz.*, because I consider it would probably tend to prevent the severe inflammatory condition of the conjunctiva and cornea, which so often results.

If, however, such inflammation have extended to the conjunctiva, and more particularly if it have proceeded to the cornea, I should not hesitate immediately to apply the nitrate of silver freely to the conjunctival surface, and to treat the affection in every respect as if it were a case of severe catarrhal or purulent ophthalmia. If it be improper or unnecessary to practise blood-letting, or to administer mercury and the other usual antiphlogistic remedies in catarrhal or purulent ophthalmia, when met with in ordinary circumstances, it must be infinitely more so when either of these forms of ophthalmia occurs after small-pox. Even the advocates of antiphlogistic treatment think it improper to administer mercury in such circumstances, where sloughing is so liable to come on. To me it appears that blood-letting, no less than mercury, must necessarily tend to favour such a process. I would say for blood-letting, substitute quinine, and the use of *wine and other tonics and stimulants*. By the adoption of this *treatment*, I apprehend the patient will have a much better chance of *recovering the function of vision unimpaired*.

*Secondary Variolous Ophthalmia.*—A milder form of ophthalmia is also very frequently observed to come on at the expiration of one, two, or three weeks after the variolous pustules have disappeared. This is termed secondary variolous ophthalmia. It usually exhibits the milder symptoms noticed in the slighter cases of catarrhal ophthalmia, but it is not uncommon to find ulceration of the cornea supervening, more particularly in individuals of a strumous constitution. The treatment is to be conducted on the principles before laid down.

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## SECTION IX.

### OPHTHALMIA MORBILLOSA AND SCARLATINOSA.

Of the ophthalmia that accompanies the other exanthemata, viz., measles and scarlatina, I need not say much. It will always be found that it is decidedly the catarrhal variety that exists during the progress of these affections. Such we might expect, *à priori*, to be the case, from the epidemic character of the exanthemata, and of this form of ophthalmia. Dr. Frick has alluded to the connexion between catarrhal ophthalmia and another epidemic disease, viz., the influenza, both of which affections he considers to be identical, and he states that during the prevalence of an epidemic influenza, those persons who were attacked with catarrhal ophthalmia were exempt from the influenza. I have before alluded to the fact, that the exanthemata are very apt to excite ophthalmia in strumous individuals. In such cases, the ophthalmia is usually more protracted, and less manageable. I need, however, here only refer to what has been said before on that subject.

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I have now brought to a conclusion my account of the various active inflammatory states of the eye in which the conjunctiva is primarily and principally affected. And, notwithstanding that a considerable space has been occupied in the discussion of what some may be inclined to consider as the affections of an unimportant portion of the visual organ, yet it will be found, on referring to what has been already accomplished

that I have had occasion to treat of several of the most interesting and really the most important affections to which the eye is subject. It will further be seen that those affections are such as will most frequently come under the notice of the surgeon when engaged in actual practice. The treatment that I have advised in the management of this class of affections, is considerably different from that recommended by our best writers. I would only further remark of it, that it is not the result of a mere idle speculation as to what I should myself conceive, from a process of reasoning, ought to be adopted for conjunctival inflammation; on the contrary, it is an actual and literal description of the practice that I am daily in the habit of resorting to for its subduction. Of the success attending that practice, I have given a few examples. I could easily add to the number, were it necessary; but they have been quite sufficient to illustrate and establish the principle for which I have contended.

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## SECTION X.

## PTERYGIUM.

I now proceed to consider the chronic diseases of the conjunctiva, and the first to which I shall allude is *Pterygium*.

This is a chronic vascular growth, affecting, as is commonly supposed, the conjunctival membrane, or, as Mr. Middlemore thinks, the cellular substance lying between it and the sclerotica.

*Situation*.—It is most commonly observed at the inner angle of the eye, where it arises from about the caruncula lachrymalis, (with which, however, it has no connexion,) with a broad base, and gradually tapers off as it proceeds towards and upon the surface of the cornea. Its shape is, therefore, triangular, and it derives its name from a Greek term signifying that it somewhat resembles in appearance the wing of an insect. The diseased structure is not usually very dense. In the slighter cases it seems to consist of little more than a thickening of the conjunctival membrane, in which is imbedded a considerable number of vessels, when it is termed *pterygium tenue*; at other times it is more dense, and has a fleshy appearance, and then it is termed *pterygium crassum*.

Although, as I have said, a pterygium is usually noticed at the inner angle of the eye, yet this is far from being universally the case, for sometimes it is met with at the temporal angle, and occasionally at the superior and inferior portions of the globe. When observed in the two last-named situations, it is often caused by a fold of the conjunctiva having become adherent to the cornea, near its circumference, when in a state of ulceration. Such, at least, has happened in more than one instance that has come under my notice, where the pterygium occurred after an attack of purulent ophthalmia. I have also noticed it after ulceration of the cornea from injury with lime. In these cases the palpebræ are usually closed for a considerable time, and thus the tendency to adhesion between the opposing surfaces is favoured. This kind of pterygium is more moveable than the other, and readily admits the introduction of a probe under it,—a circumstance which clearly proves that it is not connected with the subconjunctival textures.

This morbid growth sometimes terminates at the margin of the cornea, but, if allowed to remain, it soon passes upon it and to its centre. Occasionally it happens that there are two of these growths, one arising from each angle, and both uniting in the middle of the cornea; and some authors state that they have seen one proceeding from each of the four sides of the globe, uniting in the centre.

Generally, pterygium is confined to one eye, but sometimes it is noticed in each. The order of frequency, as respects situation, is described by Mr. Middlemore as follows:—"First, the formation of a pterygium upon one eye, placed at the inner canthus; secondly, the formation of a pterygium upon each eye, arising from the inner canthus; thirdly, the occurrence of two pterygia upon one eye, one arising at the inner, and the other at the outer canthus; fourthly, the formation of one pterygium alone, either at the outer canthus, or at the upper and lower part of the eye-ball, but not on the inner canthus." My own experience on this point does not coincide with that of Mr. Middlemore. I have most frequently seen pterygium arising from the inner canthus of only one eye; and, next in frequency, I have observed the pterygium arising from under the superior lid, also in one eye. The experience of other surgeons will, probably, still further differ.

*Peculiarity of Shape.*—A great deal of speculation and some ingenuity

have been expended upon the subject of this morbid growth, more particularly as to the cause of its invariably assuming a *triangular shape*.

*Hypothesis of Scarpa.*—Scarpa is the only author who is supposed to have offered anything like a correct explanation of the circumstance. "The constancy of this fact," says this eminent writer, "ought to be referred, in my opinion, to the adhesion of the lamina of the conjunctiva becoming stronger, in proportion as it advances from the circumference towards the centre of the cornea. For in consequence of such structure and different degree of cohesion, which actually exists in the sound eye, it must necessarily follow, in the first place, that the progress of the pterygium ought to be in every case of such disease much slower upon the cornea than upon the white of the eye; secondly, that from the greater resistance which it always meets with, in proportion as it extends towards the centre of the cornea, it must, from mechanical necessity, assume a triangular form, the base of which corresponds to the white of the eye, the apex to the centre of the cornea."

Now, if the explanation given by Scarpa were, as far as it goes, correct, it is still open to the objection that it explains only one half of the case, viz., only that half which has reference to the conjunctiva of the cornea. It does not explain the triangular figure of that portion of the diseased mass affecting the conjunctiva scleroticæ, and we know that it is not merely that portion upon the cornea which exhibits this peculiarity of shape, but that it is quite as strongly marked upon the sclerotic portion.

Nor does Scarpa's statement offer any solution of the question, why a pterygium never passes the centre of the cornea, since it can scarcely be supposed that the mechanical resistance, at that point, is absolutely so great that it may not be overcome. In truth, Scarpa's attempt at explanation amounts simply to this—that the resistance to the progress of pterygium upon the cornea, is owing to the increasing adhesion between the conjunctival covering and the cornea itself, and that, on its arriving at the centre, the mechanical resistance is so excessive that it cannot be overcome, and that thus the further progress of a pterygium is stopped. I quite agree with Mr. Guthrie in thinking that Scarpa's hypothesis, "although it may appear sufficiently plausible, is so unsatisfactory, that the problem is still open for the exercise of further ingenuity."

It is an admitted fact, that the adhesion of that portion of the con-

conjunctiva which covers the cornea, to the subjacent tissue, is exceedingly firm; whilst that of the sclerotic portion, it is well known, is quite the opposite. This firm adhesion, I readily grant, will sufficiently explain the slow progress of any vascular growth under the conjunctival surface of the cornea; but that it has anything to do with determining the figure of that growth, or of stopping its progress at a certain point, I can by no means admit. On the contrary, if this adhesion increases, as it is considered to do, towards the centre of the cornea, and the pterygium has this increased mechanical resistance to contend against, supposing its progress to be uninfluenced by other causes, it might be expected to proceed around the margin of the cornea, where the resistance is so much less, rather than towards its centre, as it always does. But the entire subject, in my opinion, requires and admits of an explanation of a more comprehensive character, which shall equally apply to the condition of both conjunctiva and cornea.

*Suggested Explanation.* — A proper explanation of this peculiarity attending the growth of a pterygium, cannot, I conceive, be arrived at without reference being made to the vascular supply of the conjunctiva.

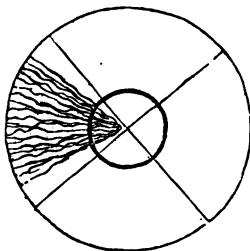
The conjunctival vessels, then, are, to a certain extent, to be considered as independent of each other. They pass into the substance of the membrane at four distinct points, one at each angle, and at the superior and inferior portions of the globe. This is the case both with the palpebral and muscular arteries. By this arrangement, it will be perceived that the vascular supply of the conjunctiva covering the globe is derived from four distinct sources, and that each set of vessels is destined to the nutrition of one-fourth of the conjunctival membrane.

Now, in acute conjunctivitis, as I formerly stated, the conjunctival vessels are usually all involved in the increased action, and, therefore, the whole surface of the membrane is more or less loaded with vessels. But it frequently happens that these vessels are only partially affected; for example, those of the inner or of the outer angle alone being affected in this way, — a condition to which the term *ophthalmia angularis* has been applied. The same is often noticed, too, in pustular ophthalmia; a single pustule is observed at the inner or outer margin of the cornea, and a fasciculus of vessels is seen running from the corresponding angle of the eye to the pustule. In these instances, the morbid action is confined to one

or another of the series of vessels to which I have alluded, and the figure they present always more or less resembles that of a triangle.

In cases of corneitis, too, we find the vessels creeping slowly from the margin to the centre of the cornea, and never proceeding around its circumference. In these cases, when the vascularity of the cornea has only been partial, I have often noticed that the vessels have assumed a shape similar to that which they exhibit in pterygium.

In like manner, in the case of pterygium, which is a morbid growth, unattended by active inflammation, but always evincing a considerable degree of vascularity, there is a partial affection of the conjunctival vessels. These vessels, at whichever of the four sides the disease happens to be developed, proceed from that portion of the periphery of the conjunctival surface of the globe, and pass on towards and upon the cornea to its centre, beyond which they never extend—thus occupying and being limited to one-fourth of the conjunctival surface, and, therefore, imparting to the diseased structure a triangular shape. Thus, I think, it will be obvious that any morbid action, particularly one of so chronic a character as pterygium, which is confined to the vessels of any one of the four sides of the globe, must necessarily assume a triangular figure.



*Causes.*—The origin of the thin membranous pterygium is somewhat obscure. Frequently it arises without any obvious cause. Usually there is considerable vascularity attends its growth, although it cannot be said, in any case, to amount to inflammation. As it most commonly affects the inner angle,—a portion of the conjunctiva which is, perhaps, more vascular and more irritable than the rest,—it is not unlikely that it may often be excited by irritation from external causes, such as foreign substances, which are always propelled towards this point by the winking motions of the lids. Beer has remarked that stone-masons, who often get fragments of calcareous matter into the eye, are most liable to pterygium. The other variety of pterygium (*p. crassum*), I have already remarked, is frequently the result of adhesion between a fold of the conjunctiva and an

erated portion of the cornea. I have likewise observed the fleshy erygium to result from the application of lime to the conjunctiva, where ceration had not occurred.

*Treatment.*—The treatment of pterygium must be regulated according to the greater or less development of the morbid growth. In the incipient stage, when it is still inconsiderable in size, and does not extend upon the cornea, it is probable that the use of some stimulant or escharotic substance, more particularly the nitrate of silver pencil, may be sufficient to arrest its progress. Dr. Mackenzie states that he has known the disease to be removed by the use of a solution of nitrate of silver, or of vinum opii. When these do not succeed, he advises scarification of the diseased mass, and snipping a portion of it away. Mr. Lawrence has a great aversion to the use of stimulating and escharotic substances; and he even supposes that, by their use, a case of ordinary pterygium may be converted into something of a cancerous or malignant character, although he admits that he has never witnessed a case of malignant pterygium. I do not conceive that there is the slightest danger of such an event taking place from a well-regulated use of proper substances of this kind. Such applications, however, are more particularly adapted to the thin membranous pterygium, where the cornea is unaffected.

*Operation.*—The fleshy pterygium will certainly not yield to the use of stimulants and escharotics, and therefore it is best at once to proceed to remove it by excision. The patient being properly placed in a chair, and the palpebræ separated by an assistant, who stands behind the patient and supports his head, the surgeon lays hold of the diseased structure with a slender forceps; by this process it is raised from the surface of the globe, and with a pair of curved scissors is easily removed, by first detaching its corneal, and afterwards its sclerotic portion.

It is not advisable that the excision should be effected quite at the base of the pterygium, because it occasionally happens that a firm cicatrix is formed, which materially interferes with the motion of the eye-ball. This has been noticed, at least, at the inner angle of the eye, and has been found to a certain extent to prevent abduction. To prevent this, Scarpa advises that a very small portion only of the sclerotic portion of the diseased growth should be excised, viz., about a line in breadth from the margin of the cornea. Mr. Guthrie is in the habit of removing about one-half of that portion of the pterygium which lies upon the sclerotica,—



a proceeding which he states has always been successful in curing the disease.

In the course of a few days after the performance of the operation, the conjunctival covering becomes renewed, and the disease in some instances will have disappeared. It is exceedingly apt, however, to return, and sometimes needs a frequent repetition of the operation.

Some authors speak of this operation as if it were always attended with success. It will be best, however, for the surgeon not to be too sanguine on this point, for his efforts will occasionally be frustrated; and if he succeed in removing the growth, and preventing its regeneration, still the change it has induced in the texture of the cornea will be usually of such a nature that a permanent opacity remains. "The young surgeon, therefore," as Scarpa remarks, "should not suffer himself to be imposed upon by the specious relations of those who assert that they have removed pterygia by the knife, and completely restored the cornea to its original natural transparency. The cornea certainly appears less opaque at that part than before; but it always remains dark, and clouded by an indelible, though superficial cicatrix." The opinion of Mr. Middlemore is in accordance with that of Scarpa, and he judiciously remarks, that "if this view be correct, then an early operation becomes necessary, with the intention of preventing those changes in the texture of the cornea which are apt to arise if the disease remains."

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## SECTION XI.

### PINGUECULA.

In the last section, when describing pterygium, I omitted to mention a little fatty-looking substance that is sometimes observed, and which is dignified by some writers with the appellation *pterygium pingue*, or fatty pterygium. If that substance be really deserving of a name, however, I should say that this is a very improper one, inasmuch as it has no resemblance to pterygium, and that it will be more appropriately named *pinguecula*—a term which is also applied to it.

Pinguecula, then, is a little yellowish body, somewhat resembling fat, usually about the size of a large pin-head, and lying imbedded in the cellular texture beneath the conjunctiva. It is generally noticed very near

to the margin of the cornea in both eyes, and opposite one or other of the angles. The surgeon will sometimes be consulted about the nature of this substance, for patients are apt to be very suspicious respecting any preternatural appearance about the eyes. Such a case requires no interference, the substance not being liable to increase, producing no inconvenience, and being scarcely entitled to rank as a disease.

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## SECTION XII.

### GRANULAR CONJUNCTIVA.

After inflammation of the conjunctiva has existed for a considerable time, there is very apt to remain a rough, uneven, elevated condition of portions of that membrane; these portions bear some resemblance to the granulations observed in the healing of a wound. This granular appearance of the conjunctiva is probably occasioned by the mucous follicles being enlarged and elevating the membrane, and thus producing a considerable irregularity of its surface. In some instances, these elevated points are small and numerous; in others, there is an extensive, fungous-like projection in one or more masses. They are usually confined to the portion of the membrane lining the lids, and more especially the upper lid.

Granular conjunctiva is a very common result of purulent ophthalmia, although it is often met with after other varieties of conjunctivitis. Notwithstanding these granular elevations are usually themselves the result of inflammation, yet they also, in their turn, assist in keeping up an irritable state of the organ, which often produces either a vascular, ulcerated, or opaque condition of the cornea, that frequently interferes materially with vision, if it do not actually destroy it.

*Treatment.*—The treatment of granular conjunctiva will vary according to the size of the projecting portions of the membrane. If these be very large it will be best to remove them at once by means of a scalpel or a pair of curved scissors. If their size be less, the application of nitrate of silver, or of sulphate of copper, in substance, will accomplish their gradual removal. In the slighter kinds of cases, the sulphate of copper is usually found to answer best: it should be kept in contact with the diseased surface for a minute or two, and its application repeated every day or as often

as may be convenient. This granular state of the conjunctiva is seldom removed very speedily; indeed, for its removal, a considerable time is often required; and, in some instances, the membrane never properly recovers its original smoothness and polish.

As the morbid condition of the conjunctiva disappears, the cornea, if not too seriously affected, clears up, in consequence of the healing of the ulcers and the absorption of the opaque matter. To aid these processes, it will be proper to prescribe some stimulating fluid, such as a solution of nitrate of silver, or of oxy muriate of mercury, of a suitable strength, to be dropped upon the conjunctival surface of the eye; or the red-precipitate ointment may be directed to be applied to the inner surface of the lower lid.

In those cases in which the general health of the patient is much impaired, (and it is in persons with such a condition of health that this granular state of the conjunctiva is most likely to occur,) the internal administration of tonics, good living, and country air, may reasonably be expected to produce beneficial results.

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### SECTION XIII.

#### FUNGOUS EXCRESCENCES.

Fungous growths, sometimes so large as to form a tumour of considerable size, are occasionally observed to arise from the surface of the conjunctiva. Dr. Mackenzie mentions cases of this description, in which the morbid growth proceeded to such an extent as to destroy the eye-ball. Such cases are but rarely witnessed, and when they do occur, we should lose no time in excising the diseased structure.

*Operation.*—The excision is generally easily effected by getting a firm hold of the tumour with forceps, and then with curved scissors severing it from its connexion with the conjunctiva. Care should be taken to leave no portion remaining, as otherwise the disease will be sure to recur. The surface of the wound should be touched with nitrate of silver, in order still further to prevent the chance of a reproduction of the morbid structure.

Mr. Watson states that he has several times deemed it necessary to extirpate the whole of the contents of the orbit, in consequence of the eye itself having become involved in the affection, although it does not appear

that there was any thing of a malignant character in the cases to which he alludes.

*Warts.*—Smaller excrescences, such as warts and the like, may be generally removed by a few applications of the nitrate of silver in substance. If this treatment should not be speedily successful, excision will be the only alternative, and should not be too long delayed.

*Anomalous Growths.*—While on the subject of morbid growths, I may here mention that I have recently observed two cases of an affection, of which I had previously seen no example, nor any description.

*CASE.*—The subjects were both infants ; there was a considerable tumefaction and bulging of the conjunctiva of the outer canthus of the eye. The bulging was evidently occasioned by a subconjunctival growth, which was quite smooth and of a cartilaginous appearance, and which terminated in a well-defined semicircular ridge at a short distance from the margin of the cornea. In the first case, the tumour was touched a few times with nitrate of silver, and gradually disappeared. In the other, the same remedy was selected, but the friends of the child ceased to attend with it before any alteration was perceptible.

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## SECTION XIV.

### XEROMA CONJUNCTIVÆ.

Sometimes, after the long continuance of inflammatory action, especially when arising from the contact of powerful escharotic substances, such as lime, or even the excessive and improper use of nitrate of silver, the conjunctival membrane becomes converted into a substance resembling skin, and hence the affection is also termed *cuticular conjunctiva*. In conjunction with this abnormal condition, there is often some adhesion observed between the opposing surfaces of the palpebræ and globe, and the conjunctiva is thickened, and has a whitish, glistening appearance. It generally happens, too, that there is but little or no mucous secretion from the conjunctival surface, and hence it is preternaturally dry ; and it is from this last circumstance that the term xeroma is applied to this state of the eye,—a term which literally signifies dry-eye.

This condition does not admit of remedy. Probably some slightly-

stimulating unctuous substance, such as the zinc ointment, introduced behind the palpebral margins, would be as useful an application as any that could be suggested.

Most commonly, the condition of the conjunctiva now under notice, is only partial, and is most apt to occur about the inferior portions of the globe and inferior eye-lid.

CASE.—I was very lately consulted about the case of a gentleman who had this affection of the conjunctiva to such an extent, that there was complete symblepharon, or adhesion of both eye-lids to the globe, the cornea being perfectly opaque, and exhibiting the cuticular condition of its conjunctival surface. In a case where so much disorganization had resulted, of course nothing could be done. This case, so far as I could learn, had originated simply from long-continued inflammation, which had baffled all the remedies employed for its subduction.

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## SECTION XV.

### ULCERATION OF THE CONJUNCTIVA.

Ulcers of the conjunctiva are but rarely witnessed, excepting as a result of pustular conjunctivitis. No doubt a process of an analogous description must exist in cases of xeroma, where that state is accompanied by adhesions. If ulceration should occur under other circumstances, it must still be treated by stimulant remedies. The ulcerated surface should be touched with the nitrate of silver, either in substance or solution.

*Hæmorrhage from the Conjunctiva.*—I have often observed the conjunctiva to bleed when forcibly separating the lids in young children who have had a very vascular condition of the membrane, and have often been informed of bleeding having occurred after the forcible employment of remedies to the eyes of such patients. Probably this arises from some superficial ulceration of the conjunctiva. I have not seen any cases of spontaneous hæmorrhage, but Dr. Hocken has recently narrated two or three such, one of which I subjoin.

CASE.—A delicate child, about four years of age, became affected with a severe catarrh. At the same time, both eyes were congested, and there was a slight catarrhal discharge from the conjunctiva. On seeing the child one morning, blood was discovered to be slowly escaping from between the lids, and the mother stated that a teaspoonful or two had previously been lost. The conjunctiva presented

an ecchymosed appearance. By a gentle local astringent this was readily suppressed and did not recur.

Cases of spontaneous hæmorrhage from the conjunctiva, occurring under various circumstances, have been reported by the older writers. They are so seldom witnessed, however, as to be rather a matter of curiosity than of importance to the practitioner.

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## SECTION XVI.

### DISCOLORATION FROM NITRATE OF SILVER.

Before terminating the subject of morbid changes, I may as well allude to the discoloration of the conjunctiva, from nitrate of silver, which is so frequently observed to follow the long continued use of a solution of that substance. This solution, after it has been used for some weeks or months, is very apt to stain the conjunctiva of a deep olive colour, which is always permanent, and, when it occurs in young persons, is usually regarded as a very disagreeable appearance. With the knowledge of this result, the impropriety of continuing the use of the nitrate-of-silver solution for any length of time will be obvious. It will be better to substitute some other stimulating application than to run the risk of producing a change of so indelible a character.

Dr. Paterson, in a recent number of the Dublin Medical Press, states that he has found a solution of hydriodate of potash remove the stain produced on the skin by the external application of the nitrate of silver. It may therefore be worth giving this remedy a trial in the similar state of the conjunctiva.\*

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## SECTION XVII.

### INJURIES OF THE CONJUNCTIVA.

The conjunctiva, being under ordinary circumstances in immediate contact with the atmosphere, is very liable to be struck by small bodies floating in it, such as particles of dust, soot, &c. Mechanics, stonemasons, and others, who are occupied in chipping, turning, and grinding various

\* By way of encouragement, I may state that I have used it recently, in a case of long standing, in which it was completely successful in removing the discolouration of the conjunctiva.

hard substances, are also very liable to have particles propelled, sometimes with considerable violence, against the eye-ball. Sometimes boiling water, heated metal, lime, or mortar, and other destructive agents, are suddenly thrown upon the eye. In all these cases, the conjunctiva is the part most exposed, and therefore most liable to suffer.

In innumerable instances, no doubt, the exquisite sensibility of the organ, and the rapid movements of its protective apparatus, are sufficient to prevent the access of foreign bodies; but, in other cases, where the individual is off his guard, and not anticipating danger, irritating matters will sometimes obtrude themselves, and be productive of much suffering. The irritation is more particularly excited by the incessant winking motions of the lids. By these motions the foreign body, whether in contact with the palpebral or the ocular surface of the membrane, is made to rub against the opposing surface. The friction excites the sensibility of the part, increased action is the result, the vessels become enlarged, the secretion is augmented, tears flow, and thus the offending matter is often expelled. Sir Charles Bell has shown, likewise, that the winking motions of the lids have a tendency to propel foreign matters towards the inner canthus, where they become deposited in the lacus lachrymalis, and then flow with the tears over the margin of the inferior lid. Indeed, we always find, whether we have been conscious of irritation or otherwise, after being out in the dust, and in the morning before the process of ablution has been gone through, that there is a greater or less collection of foreign particles deposited about the inner canthi. If, however, the particles have been propelled with considerable velocity against the eye, especially if they be sharp and angular, they may be very firmly imbedded in the conjunctiva, and then they will remain for a considerable time, viz., until they are either liberated by a process of ulceration, or removed by manual interference.

*Removal of Foreign Bodies.*—When the natural efforts are insufficient, then the assistance of the surgeon becomes needed. He first examines the ocular surface of the conjunctiva, when, if the foreign substance be adherent there, it is easily seen, as it is usually a little black matter, which is very striking against the white ground of the sclerótica. If it be imbedded in the conjunctiva, it must be lifted out with the point of a lancet, an operation which is accomplished with great ease. In some instances, I have found foreign particles to have penetrated the membrane,

and remain lodged underneath its surface ; and then it has been necessary to lay hold of them with forceps, and excise them with the curved scissors, together with a small portion of the membrane covering them.

More frequently the foreign substance is found in contact with the palpebral portion of the conjunctiva, sometimes of the lower lid, but fully as often of the upper. In the former case it will be seen by gently depressing the lower lid, when it may be removed, if not imbedded, with the point of the finger; if it be imbedded, the lancet point must be used for its detachment.

There is usually the most trouble when the particle becomes lodged under the superior eyelid. Generally, too, there is the most uneasiness when it occupies that situation, partly on account of the firmer texture of this lid producing a greater amount of pressure on the surface of the eye, and partly because the patient cannot remove the pressure from it so easily as in the lower lid. In all cases, where the patient complains of irritation in this situation, the practitioner must on no account omit to examine the conjunctival surface of the upper lid. This can only be effected by producing eversion of the lid. Owing to the spasmodic action of the sphincter muscle, there is often some difficulty experienced in causing eversion of the superior lid. The process by which it is accomplished I have before described. Dexterity in effecting it is easily acquired by practice. If there be any particle in contact with the membrane, it is usually found just within the ciliary margin, and is easily removed with the point of the finger. It is seldom adherent when in this situation ; but if it be so, it must be detached with the lancet point.

*Operation for Removal of Foreign Bodies from the Conjunctiva of the Cornea.*—The surgeon will probably be most frequently applied to, particularly in manufacturing districts, for the removal of small particles from the conjunctival surface of the cornea. Mechanics who are occupied in turning or filing metal are the most liable to this accident. The metallic particles are often propelled with great velocity, and being frequently in a state of red heat, are firmly impacted in the membrane, sometimes penetrating it, and lodging in the substance of the cornea. The irritation thus excited, coupled with the instinctive motion of the eye-ball to escape from further injury, renders it very often a matter of great difficulty to fix the eye with sufficient steadiness, and frequently some time elapses before this can be accomplished, so as to effect the removal of the irritating sub-



stance. By perseverance, however, and seizing the favourable moment when the muscles become fatigued, we shall at length succeed in detaching it. Some use the curette, others a cataract needle. I think the lancet point is as good an instrument as any for the purpose. Metallic particles generally leave a stain in the portion of conjunctiva in which they have been impacted; and sometimes it is difficult to say, from their exceeding minuteness, whether it is a particle of metal, or merely a stain, which presents itself to the surgeon's view.

The operation of removing these metallic or other particles from the conjunctiva of the cornea, is a highly useful exercise to the young surgeon, and forms an excellent introduction to the more important operations on the eye, and is one which ought to be carefully performed. In this manner, by frequently accustoming himself to observe and contend with the restless movements of the organ, he acquires the habit of seizing the favourable moment when it is comparatively quiescent, and is thus enabled to apply his instrument with the utmost precision to, the exact point to which his aim is directed. I cannot, indeed, imagine that he who is inexpert in this apparently trifling, but really important and sometimes difficult matter, can ever become a dexterous and successful operator, particularly in the higher branches of ophthalmic surgery.

It is a curious fact, that sometimes a foreign particle is lodged upon the conjunctival surface of the cornea, in such a situation as to be productive of scarcely any irritation, and proves that the uneasiness which usually results is caused by the friction of the eye-lids upon the particle rather than from any other cause. This is noticed, when anything is adherent at the inferior portion of the cornea, particularly opposite the point where the margins of the lids (which, we know, are so formed as to leave a groove or sulcus between them) come into contact.

**CASE 1.**—I was lately consulted in the case of a gentleman who, in walking about a month previously, felt something suddenly propelled against one eye. Some irritation ensued, which, after a time, disappeared, and he supposed that the foreign body had been dislodged. He had, however, frequent attacks of uneasiness, which were not severe, but sufficient to indicate that the particle still remained attached to the eye. On looking at the organ, I perceived a very minute black spot at the lower part of the cornea. I brought the point of a lancet in contact with it, when it was immediately detached, and no further uneasiness was experienced.

**CASE 2.**—A young man had a small splinter of wood stuck into the conjunctiva.

tiva, just in a line with the caruncula lachrymalis, and about half way between it and the margin of the cornea. The splinter had been in six weeks when he applied to me, and the irritation was so trifling that he continued neglecting it. It was easily removed by a slender pair of forceps. Had it been permitted to remain much longer, I have no doubt that it would have given rise to a pterygium, for there was already the vascular appearance observed in that affection, in a slight degree. After its removal, the vascularity quickly subsided.

*Irritation from Larger Objects, and Powerful Escharotics.*—Sometimes, matters of considerable size become lodged in the folds of the conjunctiva, at the point where it is reflected from the palpebræ to the globe, at its superior part, such as seeds of vegetables, leaves, portions of straw, &c. In this situation, likewise, being uninfluenced by the winking motions, they do not occasion much irritation, so that they are often allowed to remain a considerable time before the patient takes the necessary steps for their removal.

Powerful escharotic substances, such as lime, mortar, sulphuric acid, boiling water, or other substances in a state of great heat, brought into contact with an extensive surface of the conjunctiva, produce very destructive effects; in some cases, very acute inflammation; in others, ulceration, and even sloughing, are induced. In the latter cases, there are almost sure to be adhesions, of greater or less extent, formed between the palpebræ and the globe; and the unadherent portions of the membrane become converted into a white, thickened, cuticular substance, before described as xeroma.

*Treatment.*—The treatment of injuries of the conjunctiva from escharotic substances, such as lime and mortar, consists at first in carefully removing any particles of irritating matter which may still remain in contact with the membrane. The lids being everted, any foreign matters will be easily removed, either by means of the finger, a probe, or a camel-hair brush, or we may inject a stream of tepid water over their surface.

In cases where liquid escharotic substances, such as sulphuric acid, have been brought into contact with the membrane, and in cases of burns and scalds, any process of this kind is impracticable, and the immediate effects are produced before the surgeon has an opportunity of examining the eye.

*Ulceration and Adhesion of Opposing Surfaces.*—After severe inju-

ries of this nature, there is sure to be more or less ulceration of the conjunctiva produced, and this may lead to adhesion of the palpebræ to the globe. In some cases such a result, perhaps, may be prevented by the free use of oil, a small quantity of which should be frequently poured over the conjunctival surfaces. If adhesions have already taken place, but are of only recent date, I have sometimes found that they may be torn through by means of a probe. After all, however, if the conjunctiva have undergone such a change as this state denotes, it will but rarely happen that it ever regains its normal condition. If the mischief have extended to the conjunctiva of the superior portion of the globe, causing it to adhere to the upper lid, the cornea will generally be so much damaged, that it is almost better that the whole globe should be adherent to the lids, and that these should hide the deformity that has resulted.

*Operation for removal of Adhesions.*—In the slighter cases of adhesion between the conjunctival surfaces, the frena or bands may be either divided with a scalpel or dissected out with the forceps and curved scissors. This, however, is an operation which rarely succeeds, for new adhesions are almost sure to follow. In some cases the reunion may, perhaps, be prevented by the use of oil, or by gold-beater's skin being interposed. But the conjunctiva is usually so much altered in structure, and its mucous character so much impaired, that but little benefit can be expected to result from any operative proceedings.

If the conjunctiva of the cornea have been exposed to the action of the powerful substances before alluded to, there is generally a milk-white opacity produced, which is almost certainly destructive of vision. I do not mean to say that it never clears up, but it is usually found to be permanent. I recently witnessed a case in which the whole conjunctival surface had been exposed to the direct contact of metal in a state of fusion. I saw the patient very soon after the accident, when the cornea was densely opaque throughout; the injury was so severe that the whole of the cornea sloughed, and the lids and globe ultimately became adherent throughout. If, however, the cornea be only partially injured in this way, and the mischief be confined to its circumference, although an indelible opacity will probably remain, yet vision may continue unimpaired.

*Traumatic Conjunctivitis.*—Usually, the inflammation that results from injury of the conjunctiva is of the character first described as simple

ophthalmia. It may, however, be modified by various circumstances, as constitution, season, and the like. It is to be combated in the manner before mentioned. Generally, a simple evaporating lotion, or some of the sedative applications which have already been recommended, are all the local means required. This treatment, together with an occasional purgative, is sufficient for the slighter cases ordinarily met with. But it sometimes happens that there is a rather smart attack of inflammation found to result even from trifling causes of injury. Nor is it perhaps to be wondered at that persons in full health should suffer more from ophthalmia, when the result of injury, than those do in whom it arises from other causes. It is in traumatic conjunctivitis, if in any form, that blood-letting and the antiphlogistic treatment are proper. This treatment is usually found to afford the greatest relief at first. There is a period, however, beyond which it is useless to employ it, and so soon as the more active symptoms have passed away, though the inflammation yet continues, it will be best to resort to stimulants.

CASE.—John K., aged 22, was admitted an out-patient of the Manchester Eye Hospital, November 12th, 1841. He stated that, about three weeks previously, while following his occupation of a plasterer, a quantity of lime or mortar was propelled against both eyes, and produced very severe suffering and impairment of vision, which remained to the time of admission. On examination the conjunctiva of both eyes was found to be extremely vascular; a considerable portion of each cornea was also observed to be very opaque, more particularly towards the inferior and inner margins, and in the left eye there was a slight adhesion between the conjunctiva of the inferior lid and that of the globe. Much irritation and a considerable flow of tears were occasioned by exposure of the eyes to light, and vision was very obscure. He had applied to a medical man shortly after the accident, who had resorted to the ordinary antiphlogistic remedies, including the application of a large number of leeches, which had not only drained his system of a considerable quantity of blood, but had also had the effect of emptying his purse. He, therefore, applied to the hospital, in the expectation that leeches would be found him gratuitously, and his medical man had informed him that more bleeding was indispensable to the safety of his eyes. Entertaining a somewhat different view of the case, I simply drew a pencil of nitrate of silver lightly across the conjunctival surface of the inferior lid of both eyes. He was also ordered to use a solution of sulphate of zinc, as a lotion, frequently during the day, and to apply a small portion of red-precipitate ointment to the tarsal margins and within the inner canthus at bed-time. An aperient powder was also ordered to be taken occasionally. Three days afterwards, the vascularity was much diminished in both eyes; he bore exposure to light with less inconvenience,

and altogether the improvement was very considerable. The nitrate was again applied, and the other remedies ordered to be continued. The improvement was afterwards very rapid. The sulphate of copper was shortly substituted for the nitrate of silver; the vascularity gradually diminished: there continued, however, considerable opacity of the cornea of both eyes, which would probably be permanent, but as the pupil was not obscured in either, vision was completely restored.

*Wounds of the Conjunctiva.*—The conjunctiva is rarely injured in this way, except there be, at the same time, a similar injury of the deeper-seated textures, which will be of infinitely greater importance.

*Ecchymosis.*—After blows in the vicinity of the eye, it is very common to witness an effusion of blood under the conjunctiva, technically named *ecchymosis*. Indeed, this sometimes comes on spontaneously. In some instances, it is only partial in extent, in others it is diffused all over the surface of the sclerotica. It looks very much like currant-jelly in colour and appearance. I have often noticed it as a result of leech-bites, when they have been applied to the conjunctiva. The effused blood always becomes absorbed in the course of a few days. It is therefore quite unnecessary to interfere.

## CHAPTER II.

## DISEASES OF THE CORNEA.

In the preceding account of the various diseases of the conjunctiva, I have had occasion to refer so frequently to some of the morbid conditions of the cornea, as in some measure to anticipate what I have now to offer of the diseases of this latter structure. It will, nevertheless, be apparent from my remarks on the various topics connected with the diseases of the cornea, are as yet very far from being brought to a conclusion; I now, therefore, proceed to describe them in a more systematic and detailed manner.

I have often observed, of affections of the conjunctiva, that they are of real importance, except so far as they influence the condition of the cornea; this they are particularly apt to do; for not only is the cornea covered over with a layer of conjunctiva, but the vessels of this latter membrane are continued directly into the texture of the former. Hence, a common occurrence of disease of the cornea, supervening upon that of the conjunctiva; and it is a fact, that a very large proportion of affections of the cornea result from some prior morbid state of the conjunctiva.

The great importance attaching to diseases of the cornea then is, as I have so frequently explained, that they are exceedingly apt, permanently, to impair the transparency of its texture, and, consequently, by intercepting the rays of light in their passage to the retina, materially to injure, if not actually to destroy, the function of sight.

Every one is perfectly familiar with the beautifully clear, pellucid appearance of the cornea when in its normal condition; in this respect, it is not inferior to any of the other transparent portions of the organ.

Of all the transparent structures of the eye, the cornea most frequently exhibits the phenomena of disease; much of this liability to disease, no doubt, results from its exposed situation, and, as I have said, from its con-

nection with the conjunctiva. But much of it also depends upon the higher degree of vascularity which the cornea possesses, for there can be no doubt that it is much more vascular and more highly organised than the other transparent structures; and we find that, as these structures assume more of the character of inorganic and less of organic bodies, they likewise exhibit a less disposition to fall into disease. Thus, the cornea is more frequently the subject of morbid action than the crystalline humour, the crystalline more frequently than the vitreous, whilst the aqueous is almost entirely exempt.

But, it will be said, the cornea is more frequently the seat of disease than the sclerotica or the iris,—structures more vascular and more highly organised than the cornea itself. We must not forget, however, that most of the diseased conditions of the cornea are, in reality, only affections of its conjunctival covering, and that others are merely secondary affections, resulting from the extension of morbid action from the conjunctiva into the substance of the cornea, whilst the idiopathic affections of the cornea are, in reality, of somewhat rare occurrence.

One striking circumstance, in the economy of the cornea, is the entire absence of red vessels; and, indeed, it frequently happens that it is subjected to every grade of inflammatory action without a single trace of vascularity being observed. Thus, there may be inflammation, ulceration, and mortification of this structure, and not a single vessel be apparent. Notwithstanding this, we cannot entertain the slightest doubt that the cornea is plentifully supplied with blood; but the nutrient principle is so modified, whilst circulating in the corneal vessels, that no colouring matter is deposited within its texture, that deposit being perfectly transparent and colourless. On some occasions, however, as I shall afterwards explain, the cornea becomes exceedingly vascular, and the vessels are distended with red blood.

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## SECTION I.

### CORNEITIS, KERATITIS, OR INFLAMMATION OF THE CORNEA.

In those cases of conjunctivitis in which the cornea has become affected, *either with opacity, ulceration, pustules, or sloughing*, there can be no doubt that the results are attributable to inflammation having attacked the

cornea itself, or at least its conjunctival covering. The absence of red vessels, when the cornea is diseased, is no proof of the non-existence of inflammatory action, any more than their absence in the condition of health, is a proof that the cornea is an inorganic body. When we observe that an opaque matter is deposited in the substance of the cornea, it is clear that this results from disordered action of its secerment vessels; and it is equally certain that an ulcerous excavation can result only from a morbid action of its absorbent vessels. The existence of both of these orders of vessels, then, though they are invisible to the eye of the observer, is clearly established by the phenomena of disease which the cornea presents; and when, in the one case, we find that the opaque matter, deposited during the continuance of the diseased action, is removed after the healthy action is restored; and, in the other, that the excavation is filled up by the secretion of new substance, it is obvious that these morbid states of the cornea are the results of disordered vascular action or inflammation.

*Vascular Zone around the margin of the Cornea.*—Disordered vascular action, then, may clearly exist, although the vessels do not present themselves to view; but it is only in the early stages and the more active forms of inflammation of the cornea, that there is an absence of red vessels. After the inflammatory action has continued for some time, it is quite common for them to appear; they are most frequently seen immediately under the conjunctival surface, and first of all just around the circumference, exceedingly minute, and sometimes clearly discernible only by the aid of a lens, when they impart to this portion of the cornea a distinctly red appearance,—a red zone encircling the entire margin of the cornea. (This zone can hardly be confounded with that which is formed by the vessels of the sclerotica, when the iris is inflamed; the former is of a *deep red* colour, and is continued directly from the conjunctiva upon the surface of the cornea; the latter is of a *pink* colour, seated under the conjunctiva, and a *white circle* intervenes between it and the margin of the cornea.) Gradually the redness and vascularity extend more and more from the circumference towards the centre, and frequently the whole of the cornea presents this deep-red, vascular appearance. In some instances, of course, the vascularity is but partial, half of the margin of the cornea only being thus affected; in others it is still more limited.

This vascular condition of the cornea, however, as I have said, is not observable in the early and acute stage of inflammation, and is generally



the result of an extension of morbid action from the conjunctiva, the vessels being clearly seen to be continuous from the latter membrane into the texture of the cornea.

Idiopathic corneitis, or that inflammatory condition of the cornea which arises independently of conjunctivitis, is a somewhat rare affection. Inflammation of the cornea, indeed, is almost always so mixed up with conjunctivitis, as to render it difficult to decide which is the original affection; but still, in cases of injury, such as the impaction of metallic particles, and the like, in the substance of the cornea, we must suppose that the inflammation which results is independent of that of the conjunctiva.

*Symptoms of Corneitis.*—The symptoms which the cornea itself exhibits, when it is the seat of inflammation, are somewhat variable. In the early and acute stage of the disease, properly called corneitis, the surface of the cornea is sometimes covered with a great number of *minute ulcers*, as if it had been pricked all over with some sharp instrument, producing an uneven, scabrous appearance; there is generally, also, more or less *haziness* of the lamellated texture of the cornea observed. By the term haziness, is meant, a degree of cloudiness of the cornea, of an exceedingly dull and smoky hue, the very opposite of the white pearly opacity so commonly seen on its surface; sometimes the haziness is slight and partial, so as to interfere but little with the transparency of the cornea; at others it is so dense and general, as to prevent the iris from being discerned through it.

The haziness, when general, not only destroys the transparency of the cornea, but likewise imparts to it a degree of *coloration*. In some instances the colour is a dirty brown; in others it is of a greenish tint; and in others, again, it is of a deep red. Occasionally, there is an intermixture of white opaque streaks, or patches, with the dark haze, the latter usually predominating.

When the morbid action has continued for some time, as I have before intimated, the *vascularity* of the cornea is strikingly developed; red vessels are seen spreading over its surface, the haziness is more and more intense, until the whole of its texture becomes of a deep red, or brownish red. In this state, the cornea looks somewhat as if it were covered with a piece of red cloth, and hence it has been termed, by some authors, *pannus*. Velpeau, perhaps with as much correctness, compares the appearance of the eye, in this condition, to a *red cherry*. Frequently,

too, the figure of the cornea becomes altered; it *projects* somewhat, as if staphyloma were about commencing; but this condition is generally found to disappear as the diseased action subsides. In this case, moreover, the size of the anterior chamber, and the quantity of aqueous humour are usually thought to be somewhat increased.

Instead of the hazy, coloured appearance which I have described, sometimes there is a *white, milky opacity*, affecting the substance of the cornea, and causing it to bear a considerable resemblance to *ground glass*. The appearance in this case, is such as to excite in the mind of the observer the idea of the opacity being deep-seated, and occupying the lamellated texture of the cornea, its surface seemingly remaining transparent. This opacity, however, is far from always occupying the entire substance of the cornea, as we sometimes observe opaque patches here and there, with intermediate transparent spaces, and in some cases only a single nebula, of course varying considerably in size and situation. Nor is the opacity always limited to the lamellated texture, although in the true corneitis this is the portion principally affected, for, in some instances, I have satisfied myself of the existence of opacity of all the textures simultaneously, in one part confined to its conjunctival covering, in another to the proper substance of the cornea, and elsewhere to its internal lining.

These, then, are the principal phenomena which are presented by the cornea itself, when it is the seat of a high and protracted degree of inflammation. But the inflammatory action is rarely confined to the cornea. It almost invariably happens that the vessels which traverse the conjunctiva and sclerotica, more particularly the former, are exceedingly numerous and turgid. When there is decided vascularity of the cornea, this is certain to be the case. In those instances in which the cornea exhibits the appearance of *ground glass*, I have observed that there is sometimes but little vascularity of the conjunctiva witnessed, the vascularity being often confined to the sclerotica, and then the cornea itself is exempt from it.

In this, as in most of the inflammatory affections of the eye, we generally find there exists more or less uneasiness or pain in the organ and surrounding parts, morbid sensibility to light, and increased flow of tears. The degree in which these symptoms are developed is exceedingly variable. Probably, much depends upon the peculiarity of the individual constitution affected. In strumous subjects we may expect them to be more marked than in others.

There is one peculiarity in connexion with the subject of intolerance of light may be mentioned, which is, that in some of the worst cases of corneitis I have witnessed,—cases in which the cornea was extremely vascular, and so densely opaque, that not a particle of light could be transmitted to the retina,—the dread of light was nevertheless of the most marked intensity.

*Causes.*—Of the causes which operate in the production of corneitis, I can say but little. They are usually the same as those I before enumerated as giving rise to conjunctival inflammation, of which, as I have more than once observed, corneitis is frequently but a sequel. Foreign substances penetrating the cornea, scratches, wounds, &c., will, however, frequently excite a direct attack of corneitis.

It rarely happens that both eyes are simultaneously affected with an intense degree of corneitis; but it is very common to find one eye attacked first, and the other, sooner or later, taking on the same character of disease.

*Treatment.*—Respecting the treatment of corneitis, it will be unnecessary for me to enter much into detail, since my views of the management of conjunctival inflammation have already been very fully explained. The circumstance of the cornea participating in the morbid condition of the conjunctiva has, in no instance, induced me to alter my plan of treatment. Indeed, I do not perceive by what method of reasoning it can be shown that the line of treatment, suitable for the affections of the conjunctiva, is unsuited for those of the cornea, the more so as it is pretty clear that the vessels of the former are directly continuous into the latter texture.

As in conjunctival inflammation, so in corneitis, it will, I apprehend, be rarely necessary to resort to blood-letting, counter-irritation, mercury, or the ordinary antiphlogistic treatment, generally. Blood-letting may be proper in a very acute case, which has been induced by injury, and occurring in a strong, plethoric person. Counter-irritation is, according to my experience, not likely to produce any material benefit. Mercury is often very highly extolled in cases where there is an opaque matter deposited between the lamellæ of the cornea. My own view, however, is opposed to the use of mercury in such circumstances, particularly when *the affection is of an asthenic character, or when it occurs in persons of a*

strumous diathesis or of a delicate constitution, which it is especially apt to do.

In the treatment of corneitis, I do not conceive that antiphlogistic remedies are of much real service; at all events, they are generally unnecessary. If the affection be complicated with sclerotitis, and more particularly if there be iritis present, or, indeed, if there seems good reason to suppose that the latter is likely to supervene, then I agree that antiphlogistic treatment may often be needed; but, if the morbid action be principally in the external tunics, by which I mean the conjunctiva and cornea, then such treatment may be usually dispensed with.

The treatment I have found most effective in cases of corneitis has been the stimulant, and I prefer the use of the nitrate of silver in substance. It is to be applied to the conjunctival surface of the inferior lid, precisely as for a case of conjunctivitis. In addition, I generally recommend the use of a solution of either sulphate of zinc or sulphate of copper, with the application of the red-precipitate ointment at night. If the intolerance of light be excessive, and the external irritation considerable, I could prefer the decoction of poppies, or a solution of the extract of Madonna. This mode of treatment I have often found to succeed in cases which had long resisted the ordinary antiphlogistic remedies.

Whatever be the treatment adopted, we shall find that in very many instances recovery will be of slow progress, more particularly in those cases in which the cornea presents the appearance termed *pannus*. In this condition, always the result of long-continued inflammatory action, the vessels are so much enlarged and relaxed, that it will be a period of many weeks or months before they can be made to shrink and disappear.

In this description of cases I cannot understand what good is to be expected from the employment of blood-letting or mercury. According to my experience, stimulating applications alone are productive of benefit; these may be brought into immediate contact with the relaxed and distended vessels, and, sooner or later, produce first their contraction, and afterwards their final disappearance, together with the removal, either completely or partially, of the haziness or opacity.

*Strumous Corneitis*. — It has been already explained, that in the *thalmia* of strumous subjects, there is nothing peculiar except in the intensity of certain of the symptoms, and that there is nothing in the appearance of the organ itself which could lead a practitioner to say of any

individual case that it is strumous or otherwise. This is precisely the case when the cornea is the seat of the inflammation; there is nothing in the appearance of the cornea itself that would enable us to say that such is a case of strumous corneitis. I am the more particular in pointing this out, because Dr. Mackenzie has devoted an entire section of his work to what he terms scrofulous corneitis; and what is singular, and has been the subject of criticism in other quarters, is, that he seems to suppose that corneitis never occurs except in connexion with scrofula,—certainly a most erroneous notion. At the same time, it must be admitted that strumous subjects are most frequently attacked with the disease.

I will now briefly relate two or three cases of corneitis, which will serve to illustrate what I have stated as to its nature and treatment.

CASE 1.—Mr. P., æt. 36, at the time I first saw him (Nov. 1836) had been affected with a disease of the right eye for about six weeks, which had kept increasing in severity, and which had now arrived at such an intensity, as nearly to destroy vision. He attributed the attack to riding on the top of a coach on a very cold day, as the eye became affected a few days subsequently. He had experienced a similar attack about five years before, which had affected the other eye. On looking at the organ, it was observed to be in a state of extreme vascularity, the conjunctiva loaded with red vessels, these being directly continuous on to the surface of the cornea, and presenting a red zone all around its margin. The cornea was throughout hazy and dull, but not to such an extent as to prevent the iris being seen dimly through it. There were a few pink vessels traversing the sclerotica, but there was no appearance of Iritis, although the pupil seemed somewhat contracted. He had not much pain in the eye, but there was intolerance of light, and considerable lachrymation. His general health was usually good, but he was rather a pale, delicate looking man. He had been for some time under the care of a surgeon, who had employed the usual antiphlogistic remedies without success. I recommended this plan to be followed up by means of cupping at the nape of the neck, counter-irritation by a blister on the temple, the local application of extract of belladonna, and the internal exhibition of calomel and opium, with an occasional purgative. Notwithstanding the continuance of this treatment for the space of a month, the vascularity remained undiminished; the haziness had increased; the cornea had become of a deep-red colour throughout, except that a few streaks of lymph were observable here and there; it had assumed a decidedly conical figure, and it was impossible to perceive the iris, so great was the obscurity. Vision was of course totally gone, and the whole eye had an unpromising appearance, so much so that the surgeon in attendance regarded it as irrecoverably lost. I now resolved to try the effects of *stimulants*. The nitrate of silver was applied every alternate day to the conjunc-

tiva of the lower lid, the red precipitate ointment ordered to be used every night, and the eye to be fomented occasionally with warm water. In the course of a week, a decided change was perceptible; the vascularity began to lessen, the haziness and opacity were obviously yielding, the perception of luminous objects returned, and there was much less irritation about the eye. Week after week improvement was manifested, the vascularity faded away, the transparency of the cornea became restored, and in about two months there was no vestige of the disease, except a few opaque spots, which did not materially interfere with vision.

CASE 2.—A. T., *æt.* 28, a spare, delicate, young woman, presented herself with an affection of the right eye, which had been coming on for several weeks previously, and which she could not account for. There was but little vascularity about the eye, only a few vessels more than in the normal state being noticeable, and these chiefly conjunctival. The cornea, however, was opaque throughout its entire substance, the opacity being more dense in the centre, and but slight at the circumference. The opacity was such as might be supposed to result from the deposition of a milky fluid into the lamellated texture of the cornea, the conjunctival covering, apparently, retaining its transparency, but looking as if in a state of superficial ulceration. She was unable to discern any thing with this eye, but complained of very little uneasiness, scarcely any intolerance of light, and there was not much lachrymation, or other secretion, from its surface. I applied the nitrate of silver, in the usual manner, every three or four days, and directed, in the interim, the use of sulphate of copper solution and the red precipitate ointment. Under this treatment, the opacity and vascularity gradually disappeared, vision was restored, and in about six weeks the organ exhibited no marks of disease. In the course of a month afterwards, the other eye presented precisely similar morbid appearances. The disease, however, had not existed many days before she applied for assistance, so that the cornea had not acquired that intense opacity which was observed in the other eye, and it yielded more readily to the same means.

CASE 3.—This case, one of the most severe, protracted, and unmanageable that I remember to have met with, presented itself to my notice very recently, in a man nearly forty years of age, who was otherwise in a healthy condition, and in whom the disease was induced by injury. Whilst lighting a fire, a spark flew out and lodged upon the cornea; the inflammation that succeeded was most intense; he was repeatedly bled, cupped, and leeches, and his mouth had been decidedly affected with mercury, without producing the slightest influence over the course of the disease. It was about six weeks after the accident that I first saw him; at this time the conjunctiva and cornea were apparently covered over with an intensely red vascular tissue: there was scarcely any perceptible distinction between the two textures, except that the cornea was considerably more prominent, and exhibited at its centre a dirty white opaque patch of some size. Of course it was quite impossible to discern anything of the anterior chamber, so dense was the haziness and opacity of the cornea; there was still considerable uneasiness

about the eye, copious lachrymation, and some intolerance of light. I advised a complete change of remedies, depending altogether upon the stimulating applications employed in the former cases: at the end of a month, however, the improvement was very slight, and, I presume, despairing of further benefit, the patient ceased to attend.

*Inoculation with Matter of Purulent Ophthalmia.*—Chronic corneitis, in the aggravated form called *pannus* has been recently treated by Jäger and other German oculists, by inoculation of the affected eyes with the purulent matter of *ophthalmia neonatorum*. The reader will find an interesting account of this practice in Mr. Wilde's recent work on the institutions of Austria. This gentleman witnessed two cases treated in this manner, which I subjoin from his own account.

CASES.—Both of these patients, one an officer, æt. 24, the other a soldier, æt. 27, had been afflicted with this most intractable malady, in its most severe form, for many months, one, indeed, for years. In both, the cornea strongly resembled a piece of *red cloth*, being highly vascular to the naked eye; and numerous other fine vessels becoming perceptible on viewing it with a moderate lens; the intervals between the vessels, as seen with the lens, being opaque, greyish, and similar to ground glass, and the whole surface apparently raised above its normal height. In both there was considerable conjunctivitis, some photophobia and epiphora, but no abnormal discharge; both eyes of these persons were similarly affected, and it is needless to add, that they were unable to “find their way,” or pursue their occupations. They were of scrofulous habits, their general health much impaired, and the usual remedies had been resorted to without any improvement. Upon the 19th of November, Jäger inoculated one of these cases, by placing a camel's hair pencil containing some of the matter of *ophthalmia neonatorum*, previously moistened over the steam of warm water, between the eye-lids. In this instance, a glutinous, viscid mucous discharge was perceptible upon the cilia and palpebral margin within *one hour and a-half* from the time of the application of the matter which, from its minuteness and solubility, could not have acted as a foreign body. This discharge continued to increase without any other symptom, till exactly the twenty-fourth hour from the date of the inoculation, when the pain, swelling, and other symptoms of purulent ophthalmia set in. On visiting him at the thirty-sixth hour. In addition to the above, he had increased lachrymation, great intolerance of light, the cilia gathered into packets, and clotted with the discharge, which was then profuse and muco-purulent, and the superior palpebræ were swollen, œdematous, and of a purplish red colour, deepening towards their margins, which overhung the lower ones. On opening the lids, the conjunctiva scleroticæ was redder than before, swelled, and slightly ecchymosed, but *not so florid as is usual in cases of common ophthalmia*; the cornea was sunk, muddy,

and of a *lighter colour* than prior to the application of the infection, and flocculi of whitish, lymph matter floated on the discharge. Leeches, purging, fomentations, confinement to bed in a modified light, and the other usual antiphlogistic remedies were had recourse to, and on the chemosis increasing, incisions were made in it with the scissors. In both instances, the inflammation ran very high, and very active measures had to be resorted to. In one, ulceration of the cornea took place. Finally, however, *i. e.* at the end of about ten weeks, after frequent minor attacks of fresh inflammation, they recovered, with slight opacity of the cornea; and left the hospital with very useful vision; and although much broken in health, free from pain in the eyes.

In adopting the treatment by inoculation, the surgeon should be careful to select the case from which he takes his matter, so as to obtain one of simple purulent, and not of *gonorrhœal* ophthalmia. It can, of course, only operate by bringing about a new action of the diseased parts, as stimulants do. The advantage of the inoculation, probably, is that a more permanent action is produced, which continues sufficiently long to destroy the one which first invaded the organ, and may therefore properly be resorted to in such cases as have defied the ordinary stimulant remedies.

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## SECTION II.

### AQUO-CAPSULITIS, OR INFLAMMATION OF THE MEMBRANE OF THE AQUEOUS HUMOUR.

It occasionally happens that the innermost layer of the cornea,—the serous membrane which secretes the aqueous humour,—is the principal seat of inflammation, whilst its lamellated texture is comparatively exempt, a condition that is technically termed *aquo-capsulitis*. This affection, however, is so commonly witnessed in conjunction with corneitis, that I think it best to treat of it here in connexion with the general subject of inflammation of the cornea.

*Symptoms.*—The characteristic symptom of aquo-capsulitis is an exceedingly dull, turbid condition of the aqueous humour. Instead of the beautifully clear, pellucid fluid, which is imperceptible in the healthy state, the anterior chamber is visibly occupied by something resembling muddy



water, so that it becomes, in some instances, almost impossible to perceive the iris or pupil through it. This muddiness of the aqueous humour generally appears most striking opposite the pupil, not that there is really any difference in that fluid in different portions of the anterior chamber, but that there is less reflection of light opposite the pupil than opposite the coloured surface of the iris. Frequently, too, the anterior chamber is enlarged, the aqueous humour increased in quantity, and the cornea unusually prominent.

In some instances, the membrane of the aqueous humour appears decidedly opaque, dotted, as it were, with opaque spots or streaks. The opacity, in this case, is deeply seated, and when the substance of the cornea is itself transparent, the surgeon perceives, especially when he views the eye in profile, that he is looking through it when he discerns the opacity of its internal layer.

But it rarely happens, as I have said, that the cornea is entirely exempt from inflammation during the existence of aquo-capsulitis. Usually, there is considerable vascularity of the outer surface of the cornea, with some degree of haziness or nebula of its lamellated texture. In addition, there is always more or less vascularity of both conjunctiva and sclerotica found to accompany this affection. In some cases, the cornea presents an opaque appearance, described by Mr. Wardrop, as resembling the "eye of a pebble."

As the membrane of the aqueous humour not only lines the inner surface of the cornea, but is reflected on to the iris, and probably, as some think, the uvea and capsule of the crystalline, it frequently happens that many of the symptoms common to iritis supervene; thus, we sometimes observe that the pupil is either preternaturally contracted, or dilated and motionless, the surface of the iris changed in colour, pus effused into the chamber, or lymph deposited on the capsule of the lens. These phenomena, however, when they occur, I agree with Mr. Middlemore in thinking, cannot properly be regarded as belonging to the disease under consideration, but as merely accidental, the result not of aquo-capsulitis, but of iritis.

It occasionally happens, too, that aquo-capsulitis is complicated with inflammation of the internal textures generally, which has been succeeded by amaurosis. I have met with cases of this description, in which, although the anterior chamber resumed its usual transparency, vision remained permanently destroyed.

The amount of intolerance of light, lachrymation, and irritation of the organ will be found to vary in different individuals. When the inflammatory action extends to the iris, or other internal textures, there is usually a deep-seated pain in the eye very different from the uneasy sensation felt when the conjunctiva or cornea is affected.

*Causes.*—But little is known of the causes of this affection. It is probably excited by the same means as bring on an attack of corneitis, and indeed the affection itself is very likely, in many instances, only an extension of that disease.

*Treatment.*—The treatment of aquo-capsulitis is to be conducted on the same principles as that of corneitis. If the disease be of a very acute character, in its early stage, and more particularly if it be complicated with scleroritis or iritis, then the antiphlogistic treatment ought to be selected, at all events in the first instance. Under these circumstances, the application of leeches to the eye-lids, or cupping on the temple, or at the nape of the neck, will be necessary. At the same time, it will be proper to administer some preparation of mercury, such as calomel, with opium, so as slightly to affect the mouth, or until the symptoms are materially improved. The other parts of the antiphlogistic treatment are also to be enforced, such as the occasional exhibition of purgatives and abstinence from stimulating food and drinks. The eye should be shaded from light and kept cool by the free use of an evaporating lotion. The extract of belladonna should also be applied at night to the eye-brow and lids.

In protracted cases of aquo-capsulitis, or in such as are of a less active character, in which the sclerotica and iris are not materially affected, I have often found the best results to follow the use of stimulants. At first view this statement may appear a little at variance with the treatment I have before advised when there is inflammation of the internal textures. But in this affection, the morbid action is so generally limited to the outer textures, or, at all events, but slightly involves the deeper-seated parts, that antiphlogistic treatment may generally be dispensed with. In illustration, I will briefly relate a case or two which will furnish examples of the success of the stimulant treatment.

**CASE 1.**—Mr. S., about 50 years of age, a stout-looking man, but rather hypæptic, had lost the vision of his left eye for two or three years. Within the

last few weeks, he had experienced some irritation about it, which induced him to apply to me. On examining the organ, I found there was a very slight vascularity of both conjunctiva and sclerotics; the cornea was perfectly transparent, but the aqueous humour was so excessively turbid that the iris, and more particularly the pupil, could be but imperfectly perceived through it, and the pupil appeared to be much expanded and immovable, though perfectly circular. He had some intolerance of light, but no pain in the eye. Now, in this case, vision was already lost; there was no very active disease going on, the vascularity was chiefly internal, and I regarded the morbid state of the anterior chamber as a result of the external disease. I accordingly applied the nitrate of silver, in substance, to the conjunctiva of the inferior lid, which application was repeated three or four times, at intervals of a few days, and I also directed the use of the sulphate of copper solution in the usual manner. In about three weeks the vascularity had disappeared, the aqueous humour had regained its transparency, and the eye was restored to the same condition as just previous to the attack.

CASE 2.—Mrs. F., *ætat.* 33, a few weeks since had an attack of what was considered by her medical attendant to be iritis, and for which she was treated by mercury, belladonna, and antiphlogistic remedies, with the effect of leaving the pupil irregular and contracted, but of tolerably restoring vision. About three weeks before I saw the patient, inflammation again attacked the same eye, which from that time to the period when she applied to me continued watery, uneasy, and intolerant of light. She sometimes experienced pain, which appeared to shoot into the eye-ball, and complained of an uneasiness in the upper lid. The conjunctiva was rather more vascular than natural, more particularly at the upper part of the ball, where the vascularity extended on to the margin of the cornea in some degree, and the conjunctiva of the superior lid was also unusually vascular. A few of the deeper-seated pink vessels were likewise discernible at the upper portion of the globe. The cornea exhibited a slight degree of haziness about the superior margin, the aqueous humour was exceedingly turbid, and the pupil looked very dull and was much contracted and fixed. A small tubercle was also observed on the nasal side of the pupillary margin of the iris. Vision was so very imperfect that she could barely discern a finger held up before her. In this case the nitrate of silver was applied at intervals of three or four days, and an evaporating lotion and the extract of belladonna were recommended to be used in the customary manner; a mild purgative was also ordered to be taken occasionally. In about three weeks from the commencement of this treatment, the vascularity was gone, the aqueous humour had regained its transparency, the tubercle had disappeared from the surface of the iris, and vision was so far restored that she was able to read.

*Evacuation of the aqueous humour.*—I should state that Mr. Wardrop strongly recommends, in aquo-capsulitis, the evacuation of the aqueous

humour, by puncturing the cornea, an operation which he states is always followed by complete relief and restoration of the transparency of the humour. The practice, however, is I imagine but rarely adopted, and can scarcely be considered necessary.

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### SECTION III.

#### ABSCESS OF THE CORNEA.

During the progress of inflammation of the cornea, it occasionally happens that pus is deposited in its lamellated texture. This may occur in any portion; but the matter is most frequently seen at its lower part, to which it has a tendency to gravitate, where it has a certain resemblance to the white appearance observed at the roots of the nails, and hence it is termed *onyx* or *unguis*. In some instances, however, the pus is diffused irregularly over a considerable portion of the lamellated texture, and is so tenacious, that it remains adherent to that part in which it was originally deposited.

The puriform secretion, after a certain time, is either removed by the process of absorption, or ulceration occurs, and then it finds an exit through the substance of the cornea, either externally or into the anterior chamber. In the latter case, the matter will be certain to fall to the bottom, and give rise to what is termed *spurious hypopion*, in contradistinction to the genuine hypopion, which is a puriform secretion from the capsule of the aqueous humour, or from the surface of the iris.

*Treatment.*—As to the treatment of abscess of the cornea, there is seldom much good done by interference. Some writers recommend a puncture in the site of the abscess, with a view to permit the escape of the pus. I have tried this operation in a few instances, but have never seen any beneficial results therefrom, the matter being generally too tenacious and adherent to the texture of the cornea to allow of its being discharged. Reduction of the inflammation is the point at which we should aim, and this being attained the matter will be gradually absorbed, although, if there have been ulceration to any extent, there will probably be considerable opacity resulting. Indeed, if the affection have been severe or extensive, it must happen that vision will be destroyed from the *disorganised condition of the cornea that is sure to ensue.*

## SECTION IV.

## ULCERATION OF THE CORNEA.

An ulcer is always the result of inflammation, although there is frequently no perceptible vascularity of the cornea present; but it is very common to find a considerable amount of conjunctivitis, or even of sclerotitis, when there is any abrasion of the corneal surface.

Ulceration may be confined to the conjunctival surface, or it may penetrate into the lamellated texture of the cornea. In the former case, it is of course superficial; but, nevertheless, it may extend over a considerable space. When ulceration attacks the lamellated tissue, it often penetrates deeply into its substance, is broad at its outer surface, narrowing as it proceeds internally, and therefore of a conical or funnel shape. In cases where the ulceration occurs about the margin of the cornea, it is usually of a crescentic form, and has often the appearance of a deep trough.

The penetrating ulcer is the most dangerous to vision. In its course, it perforates layer after layer, until it arrives at the serous membrane lining the anterior chamber. When it has proceeded to this point, the ulcerative process is, for a time, often suspended, the membrane of the aqueous humour is protruded through the aperture of the cornea, and comes forward, appearing like a little vesicle in the centre of the ulcer, and giving rise to the condition termed *hernia corneæ*. After a certain interval, it frequently happens that the membrane of the aqueous humour is likewise perforated. In this event, the humour itself is evacuated, either wholly or in part, the iris falls forward into the opening of the cornea, and blocks it up, constituting *prolapsus iridis*, and thus a further evacuation of the humour is prevented. By-and-bye, adhesion takes place between the ulcerated surface of the cornea and the strangulated portion of the iris, the ulcer heals, and the portion of iris is permanently embedded in the substance of the cornea. This produces an appearance which has been termed *myocephalon*, since the portion of iris somewhat resembles the head of a fly stuck into the cornea. In this case, the iris being drawn into the ulcerated opening, the pupil will generally be irregular in form, and sometimes even completely obscured by the opacity which remains after the healing process is completed.

The phenomena I have described are frequently witnessed as con-

quences of ulceration of the cornea. The ulcer, however, does not always penetrate the anterior chamber, even when it has proceeded so far as to admit of the protrusion of the membrane of the aqueous humour. The restorative process may be commenced even at this crisis, new matter may be deposited in the cavity of the ulcer, and eventually cicatrization is completed. In some instances the matter deposited may be equally transparent with the original structure, but more frequently it is decidedly opaque, and remains so permanently.

On the other hand, an ulcer will not always take on the healing process, when a portion of the iris has got entangled within it. Nor is it always necessary, in my opinion, that the membrane of the aqueous humour should be perforated before the iris is protruded into the aperture of the cornea. In many instances, I believe, the membrane of the aqueous humour is pushed forward, particularly when the ulcer is large, becomes elongated, and forms a sac in which a portion of the iris lodges; and in this way large staphylomatous projections are sometimes formed which contain a considerable portion of the iris, and frequently of the choroid, as well as, probably, the vitreous humour. In such an event, the eye is certain to be permanently disorganised. In other instances, the discharge of the aqueous is followed by that of the crystalline humour, and a portion also of the vitreous, and then there is ultimately collapse of the globe.

Sometimes, as I have remarked, ulcers will become cicatrized without saving opacity of the cornea. An example of this is often noticed in the condition named *dimple*. In this case there is a minute cup-like depression, which appears as if a small portion had been chiselled out, the surface remaining perfectly smooth and transparent. This state usually continues for a considerable period, and in some instances it seems to be permanent.

After deep-seated ulceration, which has been succeeded by protrusion of the membrane of the aqueous humour, it occasionally happens that a small opening remains, through which the aqueous humour oozes, constituting what is termed *fistula of the cornea*. This condition may also last for some time, but is generally remedied by the frequent application of the nitrate of silver to the edges of the aperture.

*Treatment.*—The treatment of ulcers of the cornea is very simple. See-

ing that the ulceration is but a result of inflammatory action, it follows that the treatment of the latter condition is the one which is appropriate for the former. In the slighter cases, it may truly be said, remove the inflammation and leave the ulceration to itself. I have before stated my views as to the right mode of treating inflammation both of the conjunctiva and of the cornea; and, in the vast majority of cases, this is precisely the condition against which we have to contend. Almost invariably, there is well-marked conjunctival inflammation present during the existence of ulceration of the cornea. In many cases, too, vessels are distinctly seen to run from the conjunctiva on to the cornea, and particularly to its ulcerated portion. The vessels which are traceable to an ulcer of the cornea, are often spoken of as if their office were to repair the breach of surface that exists. I confess that I do not regard them in that light; for we often notice, as I have before stated, extreme vascularity where no ulceration exists, and I always find that the most efficient mode of treating one of these ulcers is to destroy the inordinate vascularity upon which it depends; and the healing of the ulcer in such cases will be effected by the interstitial and colourless vessels. In some cases, the division of the vessels with a lancet may be practised, but usually the nitrate of silver is the best application.

The cornea is peculiarly liable, under certain circumstances, to fall into the ulcerated state when it is the seat of inflammation; but ulceration does not usually ensue if the individual be in a condition of good general health. There is almost invariably something faulty in the state of the system which predisposes to it; and we find ulceration in its worst form most frequently occurs in infancy, in delicate children, and in old and weakly persons. "The subjects of ulcer of the cornea (says Dr. Mackenzie), and especially of the deep ulcer, are rarely robust, or in a good state of general health. On the contrary, they frequently present the indubitable signs of great weakness, and sometimes even of inanition. In emaciated infants, particularly, I have repeatedly seen the cornea of one or both eyes become thin and prominent, and give way without much and even without any apparent inflammation. In 1832 I saw several instances of the same destructive ulceration of the cornea occurring after malignant cholera. I have sometimes (he continues) been led to compare the state of such eyes, to those of the dogs in Magendie's experiments, which being fed, or

rather starved, on white sugar and distilled water, died from exhaustion ; their death being preceded by perforating ulcer of the cornea and evacuation of the humours." In the view entertained on this point by Dr. Mackenzie, I entirely coincide.

Under these circumstances then, ulceration of the cornea being presumptive evidence of a state of constitutional debility, it will evidently be improper to resort to the lowering treatment so generally recommended. The local stimulant treatment, before pointed out, is the one which can alone be employed, in most cases, with a probability of success, for depletion must certainly add to debility, and this again to extension of the morbid action. Where the ulcer is of some size and penetrating, it will be proper to apply the pencil of nitrate of silver to its edges. But, usually, it is much better to apply it to the conjunctival surface of the lower lid, as by so doing we are more likely to destroy the morbid action which gives rise to the ulceration : and, at the same time, a portion of the dissolved nitrate is carried over and in contact with the ulcer, and produces most of the beneficial effects of its direct application to the abraded surface.

This treatment, efficiently employed by the surgeon himself, produces more real benefit than all the applications he may give to the patient with orders to inject upon, or otherwise apply to the surface of the eye. Some surgeons entertain a most unfounded aversion to the employment of the nitrate of silver, even when ulceration exists. Dr. Jacob imagines that its use is sometimes productive of a dark opaque speck upon the cornea, which is indelible. I can only say that I have never seen such a result.

The other local means which I have advised for the treatment of chronic or indolent ophthalmia are also to be used. If the ulcer be situated near the centre of the cornea, and seem likely to penetrate the anterior chamber, it will be proper, in addition, to use the extract of belladonna to the eye-brow and lids, with a view of keeping the pupil dilated, and the free margin of the iris from falling into the perforation. If, on the contrary, the ulcer be situated at the margin of the cornea, then it will evidently be better to omit the application of the belladonna.

*Treatment of prolapsus iridis.*—When a portion of the iris has passed through the aperture of the cornea, and forms a *prolapsus* of some size, it will be proper to touch the protruded part occasionally with the caustic pencil ; or, if it be very large, it may, in some instances, be necessary to



snip it off with scissors, so as completely to remove what must otherwise be a source of irritation.

*General Treatment.*—For the internal treatment it will be advisable to employ tonics, such as the sulphate of quina, and the more so if the patient be of a strumous diathesis. Proper attention should likewise be paid to the state of the alimentary canal.

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## SECTION V.

### SLOUGHING OF THE CORNEA.

The texture of the cornea, it will be remembered, is made up of a considerable number of lamellæ, which are united together by means of cellular membrane. This latter tissue is particularly liable to fall into a sloughy condition, when it is the seat of inflammation, and hence, no doubt, the reason why the cornea is so susceptible to this species of disorganization.

When sloughing of the cornea is witnessed, it is usually as a result of the more violent forms of ophthalmia, such as the purulent and the variolous. Like the ulcerative process, it is but seldom observed, however, except in persons of delicate constitution, or in such as have been enfeebled by previous disease.

Although there is usually an intense degree of conjunctivitis, and even of chemosis, found to accompany a sloughy condition of the cornea, yet I have known many instances in which chemosis was not present, and the vascularity of the conjunctiva not excessive. In such cases the cornea itself has appeared to me to be the primary seat of disease. I have also witnessed the same appearance after injury of the cornea.

Sloughing may occur in various degrees of intensity. Sometimes ulcers assume a sloughy aspect, and portions of the excavated surface are thrown off. In other instances, the whole of the cornea puts on a ragged, flocculent appearance, having a dirty-white or yellowish colour, and considerable portions exfoliate, and sooner or later the humours are discharged.

Seeing that this condition of the cornea, when it exists to any extent, *does not admit* of remedial treatment, we must endeavour to preserve the

form of the organ by limiting the sloughing process as much as possible. This is to be effected only by the employment of the means before pointed out for the treatment of ulceration of the cornea.

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## SECTION VI.

## OPACITY OF THE CORNEA.

It has been stated that, during the progress of the different kinds of ophthalmia before described, opacity of the cornea is of very frequent occurrence. In all such cases the opacity is the result of an extension of the inflammatory action into the texture of the cornea, or its conjunctival surface, and is owing to a deposit of lymph, or some other turbid fluid, which, after a time, either becomes absorbed, or is organised and forms an integral portion of its structure.

But opacity is not always a product of inflammation, inasmuch as, in elderly persons, it is very common to notice an opaque circle, or a portion of a circle, extending around the margin, and sometimes encroaching very considerably upon the general surface of the cornea, where there have never been any inflammatory symptoms present. To this condition the term *arcus senilis* is applied, because it is generally witnessed in elderly persons only. It seems to arise from an impaired action of the secretory vessels, which cease to pour out the transparent, healthy matter, of which the cornea is originally formed, and deposit, instead, a firmer and more opaque substance; a change which is analogous to that which is observed still more remarkably in the texture of the crystalline in old age. But this is not the kind of opacity which usually comes under the notice of the surgeon, since, from its situation, generally at the extreme margin of the cornea, it never interferes with vision.

The opacity which results from inflammatory action presents itself to our notice under several different aspects, and in different degrees. The simplest form, and that which is most frequently witnessed, occurs either in little white circular spots, or in streaks, and these are named *maculae* or *specks*. A slight filmy opacity, having a hazy or cloudy appearance, and more diffused than the former, is distinguished by the term *nebula*. In each of these varieties, the loss of transparency is confined, or nearly

to the conjunctival surface; in the former, it is very limited; in the last, it is sometimes spread over a considerable portion of the cornea.

That very dense, shining, and pearl-like opacity, which results from deep, penetrating ulcers, or from abscess, or sloughing of the cornea, when occupying a considerable portion of its structure, is named *albugo*; when more limited *leucoma*.

*Treatment.*—The treatment of opacity of the cornea is to be regulated according to the presence or absence of inflammation. It must always be kept in mind that this morbid appearance is the result of disordered vascular action; and so long as that action continues the opacity cannot be removed, but, on the contrary, will probably increase. In some instances, it is surprising with how little active inflammation opacity is induced; and yet, in others, we find that a most intense attack of ophthalmia will be unattended with this result.

The means to be adopted for the removal of opacity, then, are, in the first instance, such as are calculated to destroy the morbid action to which it owes its origin. In alluding to cases of conjunctival and corneal inflammation, I stated, that so soon as the vascularity disappears, the opacity is, in most instances, gradually removed.

The opaque matter is more likely to be absorbed in the case of maculæ, or nebulæ, inasmuch as these are generally superficial deposits; but this is very far from being always the case, for it sometimes happens that the smallest specks are permanent. On the other hand, the opacities which result from deep, penetrating ulcers, abscess, and slough of the cornea, may usually be expected to be lasting; and yet it will occasionally happen that these clear up, far more than could have been reasonably anticipated.

The interstitial deposit which occurs in cases of corneitis, or inflammation of the proper texture of the cornea, being unattended with ulceration, as I have before explained, becomes also ordinarily absorbed, after the entire cessation of the inflammatory action.

The first object, then, in the treatment of opacity, is the reduction of the inflammation. I am not about to repeat what I have so frequently said respecting the proper means to be employed for effecting this end. I will suppose all this accomplished, and that, notwithstanding, a certain amount of obscurity remains.

Now, the process by which an opaque deposit of any kind is removed

from the texture of the cornea is that of absorption ; and the only mode in which the surgeon can be of use, is in the employment of such remedies as have a tendency to increase the action of the vessels engaged in that process. After an attack of inflammation, I have before explained that the vessels become exceedingly relaxed and enfeebled ; and it is astonishing, in some cases, how little effect is produced by the most powerful stimulating substances being brought into contact with them. In this condition we find that if there have been ulceration, the reparative process is slowly performed ; and, if there have been deposition, the absorbents are tardy in removing the superfluous matter. It becomes necessary, then, in all such cases, to apply an artificial stimulus which shall excite the dormant energies of the vessels.

The substances employed for the purpose of promoting the action of the absorbents are of the class termed stimulants ; and the one most frequently used is the *solution of nitrate of silver*. Its strength, in the first instance, should not exceed two grains of the salt to an ounce of distilled water. After a time, the proportion of the nitrate may be increased gradually up to ten grains to the ounce of water. This is decidedly the most popular of this class of remedies, and by some it appears to be regarded almost as a specific. In prescribing it, however, we must not forget the caution formerly given as to the long-continued use of the solution of nitrate of silver, viz., that it is very apt to leave a permanent stain of a deep olive colour in the conjunctiva, which, in the case of young persons, and more particularly females, would constitute a serious blemish.

The *vinum opii* was formerly a favourite remedy in the treatment of opacity, and, indeed, in chronic ophthalmia generally, but of late it seems to have been almost superseded by the solution of nitrate of silver. It would, probably, answer fully as well in the majority of cases.

A *solution of the ozymuriate, or bi-chloride of mercury* is, perhaps, as good an application as any other. One grain of the salt to an ounce of distilled water is sufficiently strong to commence with ; after a time, two or three grains to the ounce will be borne, but its strength ought to be increased very gradually, as it is considerably more irritating than the solution of nitrate of silver in like proportions. On the whole, it is decidedly preferable to the latter remedy, inasmuch as it never leaves any stain on the conjunctiva, however long its use may be continued.

A solution of the *sulphate of cadmium* has been recently employed by

several German oculists, in the proportion of half a grain of the sulphate to an ounce of water. By them it has been considered as a remedy of some value; but Mr. Middlemore, who has tried it rather extensively, states that it is decidedly inferior in its operation to the solution of oxymuriate of mercury.

The mode of employing these various substances (and many others might be added to the list), is usually that of dropping them upon the surface of the eye; and hence these fluids are commonly named "drops." We find most authors give directions to drop them immediately on the opaque portion of the cornea. It is clear, however, that this is a matter of no importance, and is apt to give rise to an unfounded notion that the drops are actually to be placed in contact with the opaque portion of the membrane, in the expectation of some chemical change being produced in it. As I before stated, these fluids can only operate beneficially by exciting the action of the absorbent vessels; and this will be quite as well accomplished by their application to the conjunctival surface of the inferior lid, by means of a camel-hair brush, which in many cases will be more convenient than the ordinary mode of dropping them on the surface of the cornea.

Various stimulants are also employed in conjunction with some unctuous substance, for the removal of opacities. Of these, probably, the *red precipitate* ointment, the *citrine* or *golden* ointment, the ointment of *nitrate of silver*, and the ointment of *hydriodate of potass*, are the best; and they also should be brought into contact with the conjunctival surface of the inferior lid, in the manner before pointed out.

A very old-fashioned remedy, and by no means the least effective, is that of blowing through a reed or quill, upon the surface of the eye, some finely-powdered substance, such as the *oxide of zinc*, *white sugar*, *red precipitate* and *sugar*, *powdered glass* and *sugar candy*, and *calomel* and *sugar*. The operation of these substances is precisely similar to that of the drops and ointment;—they produce a certain amount of irritation in the organ, which is presumed to increase the activity of the absorbent vessels.

Now it is found in practice that after a certain time, any particular substance that is employed ceases to produce the desired effect, the eye becomes accustomed to its use, and it no longer acts as an irritant. When this is the case, the plan to be adopted is either to increase the strength of

the application, or what is, perhaps, a better proceeding, to select a fresh one ; whichever of the remedies we may deem advisable to employ, should be made use of once, twice, or three times a day, according to the effect produced.

It is only by the steady use of these remedies, perhaps for a considerable time, that any material improvement can be expected to result. Indeed, I am inclined to think that they do not produce so much effect as is commonly attributed to them, for in many cases we find that the opacity is removed by the natural efforts, and in others, notwithstanding their use, it remains uninfluenced.

Some authors speak of pairing off the opaque laminæ of the cornea, others of removing them by the aid of a trephine ; and M. Dieffenbach, it is stated, actually cut out a portion of its substance, and brought the edges of the wound together by means of sutures ! Experiments have likewise been made on the eyes of animals, with a view to ascertain if the opaque cornea might not be completely removed, and replaced by a transparent one obtained from some other source, on the principle of the Taliscotian operation. It is almost unnecessary to add, that the results gave no encouragement to the performance of such an operation.

The only condition which offers a prospect of success by operation, is, in cases of central opacity, where the pupil is obscured, and vision, consequently, destroyed. In such cases, *an artificial pupil* may be formed opposite some portion of the transparent margin of the cornea, so as to give to the patient useful sight. Of this operation I shall afterwards treat when on the subject of closed pupil.

A particular kind of opacity of the cornea has been observed to follow the use of collyria containing *salts of lead*. This only happens in cases in which there is a breach of surface at the time of their use. The acetate of lead, when applied to the conjunctiva, and in contact with the lachrymal fluid, undergoes some chemical change, and an insoluble precipitate is deposited in the excavated portion of the cornea, which adheres firmly to it. I have seen many examples of this. It was first pointed out to me by my able colleague, Mr. Windsor, who published a paper on the subject in *THE LANCET* (Dec. 1830). It appears, about the same time, to have also attracted the notice of Dr. Jacob, as may be seen by reference to the *Dublin Hospital Reports*, vol. 5. It is possible that this peculiar opacity may have been previously observed, without his having been aware of the

cause, by Mr. Wardrop, who speaks of a kind of ulcer of the cornea, in which "the whole surface was covered with a matter resembling wet chalk." With the knowledge of such a result, we shall perceive the propriety of abstaining from the use of any preparation containing salts of lead, in cases of ulceration of the cornea. When a solution of superacetate of lead is prescribed, the surgeon ought invariably to order, in addition, a portion of distilled vinegar, which will lessen the risk of such a deposit. In some of these cases, I have removed a superficial layer or crust of the precipitate with the point of a lancet.

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## SECTION VII.

### STAPHYLOMA CORNEÆ.

I have before pointed out that, in the progress of the more violent inflammatory affections of the eye, and particularly such as are attended with ulceration and sloughing of the cornea, sometimes a considerable alteration becomes observable in the figure and appearance of that structure,—that it is often protruded between the palpebræ in the form of an opaque tumour, causing not only a highly disagreeable appearance, but likewise a considerable amount of irritation. This condition is named *staphyloma*, because the diseased structure bears some resemblance to a grape.

*Varieties.*—The figure of the projecting part is apt to vary, but it is always more or less rounded, being in some cases of the form of the healthy cornea, but more prominent; in others, it tapers off to a point; and in others, again, several small irregular projections are noticed. Hence the different terms *spherical staphyloma*, *conical staphyloma*, and *staphyloma racemosum*; the last term implying a condition somewhat resembling a cluster of small grapes. According to the extent to which the cornea is implicated, it is also named *total* or *partial staphyloma*.

*Mode of formation.*—Conical staphyloma is usually regarded as the result of a large penetrating ulcer or slough, which has occupied the centre of the cornea, whilst the spherical variety is thought to be produced by a general yielding of its texture, with ultimate thickening and consolidation. In *staphyloma racemosum*, the cornea has usually been ulcerate:

at several points, and in many instances has sloughed off, so as to admit of the protrusion of the whole or portions of the iris, which becomes covered by a thin semi-transparent membrane.

During the formation of a spherical staphyloma, there has generally been long-continued inflammation of the textures of the cornea. I have already explained that in cases of corneitis, there is frequently a considerable enlargement of the anterior chamber, and a corresponding projection of the cornea itself. This variety of staphyloma appears to be a more aggravated degree of the same affection, attended at first with a certain amount of attenuation, and sometimes ulceration, or sloughing of the cornea. After a time, a considerable deposition into its lamellæ results, its texture becomes thickened; and thus, from the operation of these various causes, the cornea becomes much altered in size and general appearance.

In many cases of staphyloma, the whole of the textures of the globe appear to have been subject to severe and long-continued inflammation. In such instances, both the sclerotica and cornea are found to be attenuated, displaying a bluish colour, owing to the choroid and iris being seen through them; and the sclerotica in particular often presents an irregular bulging appearance at various points. The whole eye in this case is often considerably enlarged, and assumes much of the character of hydrophthalmia; the crystalline humour is either discharged, or disorganised; the interior of the globe is occupied by a homogeneous, watery fluid; the anterior chamber is obliterated; and the iris is usually in contact with the cornea.

The size to which a staphylomatous projection arrives is exceedingly variable. In some instances, the cornea differs but little from its natural size; in others, it is so large as to prevent the closure of the lids, and it is then very frequently a source of considerable irritation. The conical staphyloma rarely proceeds to so great a size as the spherical. In the conical variety, the sclerotica and cornea seem to be frequently amalgamated; the former constituting the base, the latter the apex of the tumour; and there is sometimes but little difference in the colour or appearance of the two textures; whereas, in the spherical, there is generally a well-marked distinction between them.

The staphyloma that results after a complete slough of the cornea, (*staphyloma racemosum*, or *staphyloma iridis*), is usually not of very large dimensions. It consists of little more than the iris pushed forward



and covered by a thin pellicle, which is either the membrane of the aqueous humour, or a new substance, which has been named *pseudo-cornea*. Mr. Wharton Jones, in an interesting essay on this subject, conceives this to be the mode in which each variety of staphyloma is formed; and that in every case "the tissue composing a staphyloma is not degenerated and opaque cornea, but a new tissue, of the nature of the tissue of cicatrice, developed on the anterior surface of the iris-exposed by the destruction of the cornea itself." I quite agree with Mr. Jones, that this variety of staphyloma is formed in the manner he has pointed out; but I do not think with him that the other varieties are similarly formed. I have had many opportunities of examining portions of staphylomatous tumours after their removal by operation, and have usually found them to consist of "degenerated and opaque cornea," with a fragment of iris adhering.

In cases of total staphyloma, there is usually complete loss of vision. In the most favourable cases, the patient can barely discern the shadows or outlines of objects presented to his view; but in such as are only partial, it often happens that vision is not much impaired. If, for example, the staphyloma projects from the lower portion of the cornea, (its most frequent site,) it may be that the upper portion continues transparent, thereby allowing the light to pass through the pupillary aperture. In such a case, vision will be but slightly affected. In others, however, notwithstanding that the upper part of the cornea retains its transparency, the pupil may be obscured by being drawn downwards behind the opaque projecting part, and then of course vision will be lost, or nearly so.

Staphyloma is frequently attended with a considerable degree of irritation for some time after its formation, which in some instances appears to be increased by the friction of the tumour against the margins of the lids, as shown by the vascularity and tendency to ulceration which it so commonly exhibits. After the lapse of a certain time, however, it occasionally happens that all irritation subsides, and the patient becomes indifferent to its presence.

*Treatment.*—The treatment of staphyloma must be regulated according to the amount of irritation produced, the deformity which has resulted, and the risk of the morbid action extending to the sound eye, when only one is affected.

In some instances, indeed, a change is effected in the size of the tumour by a natural process. When the tumour has become exceedingly large,

and much distended with aqueous fluid, the most attenuated part ulcerates, the fluid contents are partially evacuated, and the whole globe is much reduced in size, and that permanently. In others, a merely temporary change of this kind is effected,—a small fistulous aperture, not so large as a pin's head, is formed near the apex of the tumour, which allows a watery fluid to escape. After the eye has been relieved in this way, the aperture closes, to be again perforated, after a time, when the distension becomes considerable; a circumstance that would seem to indicate in these cases a disposition to hydrophthalmia.

Frequently a staphyloma, when formed, remains stationary, and produces little or no inconvenience; in this event, the question is one of personal appearance, and the patient must decide for himself, whether or not he will submit to such measures as are calculated to remove the projecting surface. In the case of children it must be left to the decision of the parents or friends.

When much irritation is experienced, the patient is usually anxious for the removal of the tumour; and in the case of children it is desirable to recommend this operation. This is always to be advised when the disease is confined to one eye, because there is then reason to apprehend its extension to the other.

Now, it is a clearly established fact, that when there is any morbid process going on in one of these organs, there is always a tendency in the other to participate in the same; and it is remarkable that precisely the same texture is almost certain to be attacked in the eye which is secondarily affected, as was the chief seat of disease in that in which the mischief originated. This is the case with almost every form of ophthalmic disease: we see it in the catarrhal and purulent ophthalmia; in the ophthalmia of strumous subjects; in inflammatory affections of the cornea, sclerótica, and iris; in cataract, amaurosis, and even after injuries of the different textures of the organ. True, this is not invariably the case; but it happens so frequently, that we may nearly always fear that if one eye is affected with disease, it will be communicated to the other. It becomes important, then, to bear this in mind, and to recommend the removal of a source of irritation which may ultimately lead to the extinction of vision, and especially if the patient complains of weakness and irritability of the other eye. When both eyes are affected with total staphyloma, attention must then be directed to the amount of irrita-

tion produced by the projecting portion of the cornea, or to the resulting deformity; and an operation is to be performed if either of these conditions should indicate its propriety.

*Operation.*—The operation to be recommended for the removal of staphyloma, is the excision of the projecting part of the tumour. Now this operation is one of considerable importance to the young surgeon; and I venture to say, that he who can perform it with ease and dexterity, is well qualified to enter upon that most difficult of all operations on the eye, the extraction of cataract. On this account I would recommend him to pay particular attention to the details of the operation for staphyloma, and never to shrink from its performance when a proper opportunity presents. The habit of frequently performing it will be the best preparation for the higher duties of the ophthalmic surgeon; and it may be entered upon without fear of doing mischief, since the eye is irreparably lost for the purposes of vision; but still it should be executed with as much care as if it were likely to restore the patient to sight.

The patient should be placed in the same position as for extraction, either in a chair or on a sofa. An assistant is to secure one of the lids, the other being controlled by the operator, who sits either before or behind the patient, according to the position of the latter. It is well to practise both modes indifferently, and to acquire the habit of employing either hand. An incision is first made into the tumour, by pushing a cataract knife, or a sharp bistoury, through the centre of the cornea and near its base, perforating it first at the temporal and then at the nasal angle; and afterwards cutting out either directly downwards or upwards, as in the operation for extraction of cataract. There is generally a gush of a clear, watery fluid, and also an escape of the lens when present, which succeeds the completion of this stage of the operation, and the eye becomes flattened and sunken in appearance. The flap of the cornea is then laid hold of with the forceps, and snipped off with the curved scissors; the latter being at the same time carried around the remaining attached portion of the cornea, near to its margin, when the operation is completed.

It is a disputed point as to the size of the portion of cornea to be removed in this operation. The axiom of Celsus is strongly urged by some practitioners, to remove only a small portion; *ad lenticulæ magnitudinem excindere*. Scarpa states, that “the practice of removing the staphyloma

at its base, and the still greater evils which are produced by the division of this tumour, including the sclerotica, invariably results in inflammation of the eye-ball and eye-lids, most acute pain in the eye, watchfulness, convulsions, copious suppuration, and sometimes rupture of the eye and eye-lids."

As the general principle may be correct, that the less the proportion of the staphyломatous mass which is removed, the less will be the violence of the symptoms which result. But that the violent symptoms described by Scarpa invariably, or even frequently, succeed to the removal of the entire cornea, or, indeed, of a portion of the sclerotica, is not in accordance with my experience. I have never seen convulsions occur, or rupture of the eye-lids, in infants, and in them but very rarely, but quite as often when only a very small portion of the tumour has been removed. Inflammation and suppuration of the eye-ball do occasionally result, but they are by no means frequently found to succeed to this operation.

The principal objection to the removal of so small a portion of the cornea as is recommended by Celsus, I have found to be, that it frequently does not produce the desired effect. In two instances in which I tried this operation, such at least was the result. In each I removed but a small portion, merely the most projecting point, but still sufficient to allow of a complete discharge of the humours; and in each the wound healed in a short time, when the size of the tumour was but very slightly reduced. In one, a young child, I repeated the operation, and removed a larger portion with complete success, and without giving rise to any suffering than on the previous occasion; but, in the other, a boy of fourteen years of age, I was unable to persuade him to submit to the operation which had previously failed. I have since, however, generally removed the tumour at, or very near to, the base of the cornea, a proceeding which never fails to cause a considerable shrinkage of the globe, and so to remove the irritation.

The Celsian method of operating cannot be depended upon by any surgeon, indeed, virtually admitted by Scarpa, inasmuch as he further recommends, in order to ensure a sufficient amount of irritation, that the wound should be left "for a long time uncovered and exposed to the air, and the wound should be (afterwards) enlarged by removing another portion, and thus facilitating the discharge of the humours and admission of the air to the cavity of the eye. The same object (he

continues) may be gained by introducing into the eye-ball, through the circular wound of the cornea, a small fold of linen which is removed as soon as a sufficient degree of inflammation and suppuration has been excited in it."

Such proceedings as are here advised by Scarpa, appear to me far more objectionable, and not less likely to be followed by the disagreeable symptoms which he is desirous of obviating, than the operation of removing a larger portion of the tumour in the first instance. But, after all, perhaps the extent of projecting surface to be removed should be determined by the effect intended to be produced. If the surgeon wishes to remove so much as to destroy all danger of irritation being communicated to the sound organ, or to render available the use of an artificial eye, then a considerable portion must be removed; if, on the other hand, a slight reduction only of the size of the globe is contemplated, as in cases where the deformity is but trifling, then the removal of a small portion will be sufficient.

In one instance, in which, owing to the restlessness of the patient, I was unable to remove any portion of the cornea, the case nevertheless did well, although it is not usually to be expected.

CASE.—Elias S., aged nine, was brought to me on account of a large staphylomatous condition of the right eye. Several months before, he had been the subject of severe inflammation of that eye, for which he had been treated in the ordinary way by his medical attendant, the result being the destruction of vision, with a staphylomatous projection of the organ. There was still a considerable amount of vascularity, but he had no pain. The tumour was seen to project between the tarsal margins, so as to keep up irritation; its shape was hemispherical, and it appeared to be confined to the cornea. I made an incision round the upper half of the cornea, and intended to remove the flap with a pair of curved scissors, but the boy was so violent and unmanageable that I was compelled to desist. A large quantity of aqueous, and apparently the whole of the vitreous humour, with its investing membrane, escaped from the eye, and there was a complete collapse of the globe. I made considerable pressure on the eye, and introduced the forceps freely into the posterior chamber, so as to ensure its being completely emptied. The usual plaster dressings were applied. He visited me again a few weeks afterwards, when the eye had recovered from the effects of the operation and was considerably reduced in size, but without becoming atrophied, *in fact remaining about the natural size.*

*Some surgeons advise the passing of a hook, or a ligature, through the*

substance of the tumour, in order to give greater command over it during the operation. Such a proceeding is perfectly unnecessary, and as it is calculated to add to the suffering of the patient, it ought never to be resorted to.

*After Treatment.*—The after-treatment, in general, should be very simple. The application of two or three strips of adhesive plaster, passing from the brow over the centre of the lids on to the cheek, is a very suitable dressing, and tends to prevent the winking motions of the lids from irritating the wounded surface of the globe. The same end, however, will be attained by the use of a compress placed over the closed lids, and secured by means of a roller, or light bandage, placed around the head. If severe inflammatory symptoms come on, as indicated by pain, tension, and swelling of the globe and of the lids, the application of leeches may be useful; and these should be followed by the use of warm fomentations and poultices. Opium may also be administered internally; and it is a good practice to prescribe a large dose, to be taken immediately after the operation, with a view of preventing severe reaction.

In the course of a few days, new matter will be found deposited in the site of the wound, which gradually becomes organised, and bears some resemblance to the texture removed. A considerable degree of collapse of the globe usually succeeds to the operation; in some cases to such an extent, as no longer to afford a support to the concave surface of the lids, which therefore have a flattened or depressed, and rather unsightly appearance. In this event, the only remedy is an artificial eye, which supports the lids, and is capable of being moved about in harmony with the sound one; or, when the patient cannot afford this luxury, he must satisfy himself with wearing a patch over the front of the orbit.

When any unfavourable symptoms are witnessed subsequently, I believe they depend more on the irritable condition of the patient, than on the nature of the operation. Generally speaking, but little trouble is experienced: in most cases, the patient is able to walk home after the operation, and suffers but little pain or inconvenience. But it occasionally happens that much suffering results; violent neuralgic pain is experienced, considerable hæmorrhage follows, and now and then active inflammation of the globe succeeds. The following is one of the most severe and troublesome cases of *this description* I remember to have witnessed.

CASE.—J. B., a delicate-looking man, about thirty years of age, from the country, was admitted on account of a very large staphyloma affecting one eye, which was of a spheroidal shape, and projected considerably between the palpebral margins, so as to occasion great irritation. There was no appearance of ulceration, the tumour presenting a dense, firm, and opaque surface; and a very large vessel was seen to proceed from the inner canthus, and ramify over its projecting front. He was very desirous that something should be done to remove the constant annoyance which was caused by its presence. The tumour was therefore excised at the point of junction between the sclerotica and cornea, in the manner before explained. He suffered an unusual amount of pain during and immediately after the operation, so that it was deemed advisable that he should remain in the hospital. He was removed to bed, and had forty drops of laudanum administered, when he became easier in a short time. In the course of two or three hours, however, I was sent for in consequence of hæmorrhage having occurred. I found the eye-ball, which had completely subsided after the operation, distended as large, or larger than before, with coagulated blood, and presenting a most frightful appearance, looking very much like a case of fungous hæmatodes in the last stage. The blood was constantly dropping from the eye on the floor, where there was also a coagulum of very large size. I simply directed cold wet cloths to be laid around and upon the surface of the lids; a proceeding which had the effect of speedily restraining and ultimately stopping the hæmorrhage. The bleeding probably relieved the pain, and tended to keep down inflammation, as he did not complain much afterwards. The eye-ball continued swollen, and completely distended with blood, for many days; but it gradually subsided, owing to the separation of the coagulum, and ultimately sunk back into the orbit; the patient being effectually relieved.

Other modes of treating staphyloma have likewise been resorted to. Mr. Wardrop, observing that in some cases, as before pointed out, a fistulous aperture is formed in the projecting part of the tumour, has recommended this process to be imitated by puncturing it frequently with a needle: in one instance, he performed this operation sixteen times, and effected a cure, vision being restored. It is evident, however, that this treatment can only be successful in the most favourable cases, where the staphyloma is but partial, and unattended with that extensive disorganization which accompanies the severer grades of the disease.

Some surgeons employ a ligature for the cure of staphyloma: they perforate the centre of the tumour with a needle armed with double threads; one of which is tied firmly round the upper half of the tumour, the other around its lower half. Others pass a seton through the substance of the

tumour, which is kept there for some time. Neither of these, however, can properly be recommended, since they often produce a great deal of irritation, without materially benefitting the case, and are much inferior, as means of cure, to the removal of the tumour by excision.

In cases of partial staphyloma, the occasional application of the nitrate of silver, or of the caustic potass, to the projecting portion of the cornea, is often followed by such a degree of thickening and consolidation of the surface, as to prevent ulceration, and in some cases appears to produce a certain amount of contraction or diminution of its bulk. In those cases of partial staphyloma, in which the pupil is obscured behind the opaque projecting portion of the cornea, restoration of vision may sometimes be effected by enlarging the pupil, as by puncturing the sound part of the cornea, and drawing out a small piece of the iris.

In staphyloma racemosum, if the portion or portions of iris that protrude be very large, it is best to excise them with the curved scissors; if smaller, the application of the caustic pencil will cause them to recede, or slough off.

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## SECTION VIII.

### CONICAL CORNEA.

Sometimes the cornea is found to project at its central portion, without any or with a very slight degree of accompanying opacity. This state is termed *staphyloma pellucidum conicum*, or, more commonly, *conical cornea*. The alteration in the figure and transparency of the cornea, however, in this case, bears no proportion to what is observed in the proper staphyloma. Indeed, on a superficial view, it is very liable to be completely overlooked; and many, even professional persons, might examine the eye of an individual thus affected, particularly when the morbid change is not fully developed, without discovering its existence. It is only on looking at the eye *laterally* that it becomes very apparent; but it is then perceived that the centre of the cornea presents a decided conical projection. When examined in front, the disease being somewhat advanced, there is usually a brilliant star of light observed at the end of the cone; a phenomenon which, in some cases, is very striking, and arises from the excessive refraction of the rays of light.



Occasionally, the alteration of figure is the only unnatural appearance observed ; but, sometimes, and particularly after this change has existed a long while, the apex of the cone becomes decidedly opaque. Most commonly, this is the only portion of the cornea that loses its transparency ; but we, now and then, meet with instances in which opaque spots or streaks are observed at several points. In one case, lately under treatment, the individual being a schoolmaster, about forty years of age, the change of form has apparently resulted from chronic ophthalmia, there being increased vascularity of the conjunctiva, with opaque deposits scattered irregularly over the surface of the cornea in both eyes, the conical projection, however, being confined to one.

This change from the hemispherical to the conical figure of the cornea is found materially to interfere with the perfection of sight. In the most favourable cases, the eye is rendered exceedingly myopic, so that the patient is obliged to hold any object which he is desirous of examining close to him. If opacity be superadded to the change of form, then vision becomes still more imperfect, so as, in some cases, to prevent the patient from following any useful employment. In addition to indistinctness of sight, objects frequently appear to be multiplied. This last condition, it has been stated by Sir David Brewster, is caused by some irregularities on the surface of the cornea, which are analogous in their effects to the divisions in the common multiplying glass.

Conical cornea is, in all probability, directly induced by a process of absorption or attenuation of the central portion of the cornea (similar to that which takes place in the sclerotica), which yields to the pressure of the aqueous humour. In one case, which occurred in the practice of my colleague, Mr. Windsor, to whom I am indebted for the opportunity of an examination *post-mortem*, the cornea generally was found very much thinner than natural, and in the centre especially so. Dr. Jäger relates a case in which the circumference of the cornea was considerably thickened, but the projecting point was very much thinner than usual. Mr. Middlemore likewise examined the cornea in a similar case, and found the centre much attenuated, while the circumference retained its normal condition.

Of the exciting causes of this affection, but little can be said. In the majority of cases, there is no marked inflammatory action, either accompanying or preceding the change in the figure of the cornea ; but, as there is so great a tendency to opacity in most cases, and actual inflammation

existing in a few, it is not unlikely that there may be disordered vascular action generally present.

*Treatment.*—Of the treatment of conical cornea, I am not able to give any very satisfactory information. Mr. Travers speaks favourably of the effects of blisters, tonics, cold bathing, and general constitutional treatment. Mr. Guthrie recommends the frequent exhibition of emetics, which he states to have been useful in a few instances. Unfortunately, we almost invariably find, that, when we put any of these remedies to the test of experience, they are found to be of little or no value. In some instances, if the patient be made to look through a small hole in a card, or other substance, placed before the eye, vision is considerably improved. Double concave glasses are also occasionally useful, but they are not so generally serviceable as might have been supposed.

When this alteration in the form of the cornea is confined to one eye, it is not of so much importance, and individuals will seldom persevere with the use of such remedies as are most likely to be beneficial; but, when both are thus affected, patients are often desirous that something should be done, and accordingly such remedies as are recommended will be sedulously employed. If the means previously mentioned (combined with the frequent application of stimulants, such as sulphate of copper in substance or solution, to the eye) fail in benefiting the patient, it may then be desirable to try the effect of some operative proceedings that have been suggested.

*Operation for Artificial Pupil.*—Now, it has been found that the application of belladonna to the eye has been serviceable, by dilating the pupil, and thus allowing the rays which pass through the circumference of the cornea to enter the posterior chamber. The observance of this fact, probably, has led some surgeons, as Mr. Middlemore states, to perform an operation with the view of bringing the pupil from opposite the central conical portion to the margin of the cornea. This will be best effected by making a small aperture with a cataract knife through the margin of the cornea, at its lower or outer portion; a fine hook is then to be introduced into the opening, and a small portion of the iris drawn out and cut off with the scissors. In short, the same operation should be resorted to as for the formation of an artificial pupil, in cases of central opacity of the cornea. Mr. Tyrrel relates several cases which were benefited by this operation.

*Operation for Removal of the Crystalline Lens.*—Sir William Adams

has likewise reported cases of conical cornea which were materially benefited by the absorption of the crystalline lens. In one of the cases, the affection was complicated with cataract, and, on the removal of the latter, the patient regained useful vision. In another, in which the cornea alone was affected, the lens was removed by absorption, and the patient was enabled to read the smallest sized print without the aid of a glass. The object of this operation is to diminish the excessive refraction, by removing one of the principal agents concerned in that process.

In those cases in which no useful vision remains, it will be quite proper to have recourse to one or other of these operations, since, as yet, there appears to be no known method of restoring the original form of the cornea. The operation of removing a portion of the iris, so as to bring the pupil to the margin of the cornea, being the more simple, I should prefer trying first; and, if no sufficient benefit were found to result, I should afterwards remove the lens, either by extraction or by procuring its absorption. This practice was adopted in the following instance.

CASE.—Joshua B., *æt.* 47, was admitted a patient of the hospital, August 21st, 1841. He stated that he had always enjoyed excellent health, with the exception of a severe attack of cholera eight years since. Seven years before, he had an attack of inflammation of both eyes, since which his vision had been somewhat impaired, although he was able to follow his usual employment, as a cotton-spinner, until about six months ago, when he ceased work, his sight being no longer such as to enable him to continue it. He could find his way about, and read a moderate-sized type when held at the distance of two inches from his eyes. With the right eye, when the lids were almost closed, as in drawing them together by pressure at the external canthus, he could read at a greater distance, but not so with the left. When looking at a lighted candle or other luminous body, it appeared to be multiplied about ten or twelve times, but no chromatic aberration was noticed. The multiplication of images was not observed when looking at other objects; and when the eye-lids were nearly closed, in the manner before-mentioned, luminous objects appeared single.

On looking at his eyes, there was a peculiar sparkling appearance at the centre of the cornea, which was seen to be pointed in the form of a cone and decidedly opaque, the opacity being most extensive in the left. In other respects, the eyes appeared perfectly healthy. He had for some time past been under the care of a surgeon, who had used various remedies without benefit. Concave glasses were not found to improve vision in the least degree, nor did looking through a small hole in a card make any improvement. He was ordered to use a solution of extract of belladonna, and to take a purgative occasionally.

Sept. 25th. He had used the remedies prescribed without experiencing any

change in the condition of his eyes. As there was no probability of his being benefited by any medicinal or topical applications, I advised him to submit to some operative proceedings. The patient having assented, the operation proposed to be first tried was that of removing a portion of the iris, so as to bring the pupil to the bottom of the anterior chamber and away from the opaque and projecting portion of the cornea. This I determined to do in one eye first, and as the left was the most affected, it was selected for the experiment. A puncture was accordingly made with an extraction-knife at the lower border of the cornea, close to its junction with the sclerotica, sufficient to admit of the introduction of a hook or small forceps. This was followed by the immediate discharge of the aqueous humour and the protrusion of a portion of the iris. The prolapsed iris was then laid hold of with the forceps, drawn out of the wound, and snipped off with scissors. The pupil was now observed to extend close to the inferior margin of the cornea. The eye-lids were then closed and secured with plaster dressings.

29th. The inflammatory action had been trifling. The operation was seen to have perfectly succeeded; the pupil was clear and extended to the bottom of the anterior chamber, presenting the exact appearance observed in the congenital defect termed *coloboma iridis*. Vision, he thought, was slightly improved.

October 16th. No particular change was observable in the appearance of the eye since last report. The slight irritation which followed the operation had long since subsided; the improvement of vision was found to be very trifling; he could read small type at the distance of three inches, whereas before he could only do so at that of two; and there was a proportionate improvement in viewing other objects. This limited amendment was far from being satisfactory to the patient, who was desirous that a further attempt to improve the vision of this eye should be made. The removal of the crystalline lens was accordingly resolved on, and extraction was the operation I thought most likely to meet the necessities of the case. It being important to preserve the transparency of the inferior portion of the cornea, opposite the newly formed pupil, I determined to resort to the upper section. The patient was accordingly placed on a sofa with his head sufficiently raised, and I seated myself on a stool behind. The lids being properly secured, my double-edged extraction knife was passed rapidly across the anterior chamber, the point entering at the outer angle and being brought out at the opposite side, cutting upwards around the superior margin of the cornea, and admitting of the immediate discharge of the aqueous humour. An interval of about two minutes having elapsed, the lids were then separated, the curette introduced beneath the flap of the cornea, and the capsule gently lacerated, when the lens, which was perfectly transparent but having a slight yellowish tint, was immediately discharged, without any pressure and without any escape of the vitreous humour. The flap having been properly adjusted, plaster dressings were then applied in the usual manner. The patient was directed to remain on the sofa for a couple of hours, and afterwards to be carefully conducted to bed. A

draught, containing thirty drops of laudanum, was ordered to be taken at bed time.

17th. He had some pain during the afternoon subsequent to the operation, but was quite easy all night, although he did not sleep much. The dressings had not become loose, and were, therefore, not disturbed.

19th. He has had no pain since last report. The dressings were this morning removed for the first time since the operation; there was but little inflammatory action present; the wound appeared to have nearly healed, and there was no constitutional disturbance; as the bowels were costive, a senna draught was ordered.

23rd. The dressings had been changed every day since the last report. Slight inflammation continued. The plaster dressings were directed to be discontinued, and the saturnine lotion to be used instead. The senna draught to be repeated occasionally. No unpleasant symptoms occurred after this, and the patient returned home at the end of three weeks from the time of operating.

Dec. 11th. The eye had long since recovered from the immediate effects of the operation, but the pupil was blocked up with the opaque capsule, so that he had very little vision. A cataract needle was introduced posteriorly to the iris, and the capsule divided and freely lacerated. After this, he could clearly discern the objects around.

13th. The opaque capsule, which after the last operation had receded into the posterior chamber, had again advanced into the pupil, so that vision was still much impaired. But little inflammation had resulted. He was ordered to use the saturnine lotion, and to take a purgative occasionally.

Feb. 5th, 1842. The opaque capsule was nearly absorbed or otherwise removed, but there still remained a small portion, like a piece of fine thread, stretching across the lower part of the pupil. A needle was again introduced, and the piece of capsule cut across. Immediately afterwards, he was able to read very small print at the ordinary distance. But trifling irritation succeeded to this operation, and in three or four days afterwards he was enabled to return home.

The result of the operative proceedings in this eye was in the highest degree satisfactory, for, as the patient himself stated, he could now see with it as well as he had done any time during the last twenty years. He could read small print at the usual distance, and see surrounding objects a great way off. Looking through a hole in a card now improved his vision slightly, but no other optical contrivance was of any service. The cornea of this eye when contrasted with the other, was seen to be considerably less conical—indeed, might be said to have lost its conical shape altogether—whereas previous to the operation it was most so. This result would, probably, be due to the contraction of the cornea during the healing of the wound.

The improvement of this eye having been thus great, and the right remaining not merely useless but a source of confusion to the other, the patient was desirous that it also should be subjected to the same operative proceedings, and it was accordingly determined to gratify his wishes. The alteration of the form of

the pupil was effected in the same way as in the other eye, but without any improvement of sight. About six weeks afterwards, I proceeded to extract the lens, which was readily effected, and he went on well for the first week. He had then a severe attack of inflammation, which assumed the character of ophthalmitis, and terminated, notwithstanding the employment of the usual antiphlogistic treatment, in suppuration and atrophy of the globe. After the operation he had been very inattentive to the directions given—had got up and gone about the house, and even out of it, at the expiration of the third or fourth day, the weather being at the time extremely hot and sunny, so that the result was not surprising.

Notwithstanding the unfortunate termination of the last operation in this case, it is clear that the change in the position of the pupil, and the subsequent removal of the lens, are processes well calculated for the improvement of vision in a class of cases which are usually abandoned as irremediable. It will be seen that little is to be expected from the mere change in the position of the pupil; whilst, on the other hand, it appears certain that a greater improvement will result by effecting that change previously to the removal of the lens, inasmuch as the opacity of the cornea, or, what is equivalent—its conical centre—will otherwise materially obstruct the passage of the rays of light. Extraction, when not contra-indicated by particular circumstances, is probably the best mode of removing the lens, because after a wound of the cornea, a certain degree of contraction of its texture, and a consequent depression of the cone, is almost sure to follow. Such at least happened in the case just related; and probably this mode of treating conical cornea, when other means are abandoned, is the most perfect of any that can be adopted, embracing, as it does, three distinct and important points—first, a change in the position of the pupil; second, the removal of the crystalline lens; and third, an alteration in the figure of the cornea.

A very ingenious and highly interesting paper has recently appeared from the pen of Dr. Pickford, of Brighton, on the subject of conical cornea. A summary of his views is comprised in the following paragraph. "I believe conical cornea to depend upon some disturbance in the functions of the great sympathetic, spinal nerves, and par vagum; producing, through the medium of the lenticular ganglion and fifth pair of nerves, faulty action of the nutrient capillaries and absorbent vessels of the cornea itself: that emetics and purgatives, by the powerful influence they induce upon the

gastric, associate, and consensual nerves, restore the healthy functions of the weakened nutrient and absorbent vessels, the result of which is a slow but progressive retraction of the diseased corneal growth, and a consequent restoration of vision."\*

It will be seen from this extract that Dr. Pickford's treatment is not very different from that advocated by Messrs. Guthrie and Travers. He gives a detail of three cases which appear to have been benefited by the emeto-purgative treatment. That some cases will improve under this management there can be but little doubt, but that it will be generally successful is more than can be looked for. Dr. Pickford arrives at the conclusion, by a process of reasoning, that a removal of the lens cannot be beneficial to vision in a case of conical cornea, but what will he say to the recorded facts of Sir W. Adams? In favour of his own cases, he quotes the aphorism of Mr. Abernethy, "that a case is worth all the reasoning in the world, and one fact better than a hatfull of theory." Whether he would limit its application to his own facts and cases, or extend them to others, does not appear.

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## SECTION IX.

### MALFORMATIONS OF THE CORNEA.

*Malformations.*—I have met with a few cases of congenital atrophy of the cornea, in which there was likewise a general deficiency of the globe, the result either of disease or of arrest of growth; this condition is usually accompanied with cataract, or amaurosis, or both, and is commonly irremediable.

*Case.*—Mary W., aged one month, was admitted an out-patient of the hospital July 20th, 1841. The external aspect, when the eye-lids were closed, was that of great depression, such as is seen after the evacuation of the humours, the palpebræ being flattened, instead of possessing the convex appearance observed in the normal state. On separating the lids, the eyes presented the same sunken and flat appearance, resembling those of a small bird, being evidently imperfectly developed; the corneæ were transparent, but of not more than half the usual dimensions; the irides were dark blue, and a greyish white body—evidently the

\* Dublin Medical Journal, Vol. xxiv. p. 387.

opaque lens—was seen within the pupils, which latter were of the ordinary size. No other morbid appearance was observable. There had, however, been a slight mucous discharge from the conjunctival surface of both eyes, almost ever since the period of birth, but this was inconsiderable. The child occasionally opened both eyes, and appeared to fix them on the window, as if sensible of the presence of light. In other respects she was in good health. The usual general and local remedies were ordered, with a view to the correction of the morbid secretion from the conjunctival surface.

23rd. The mucous discharge had much abated. Some extract of belladonna was ordered to be rubbed around the eyes every night.

27th. The pupils were dilated, and the lenses seen to be perfectly opaque.

Jan. 4th, 1842. The child had been occasionally brought to the hospital since the last report, but no change was perceptible in the appearance of the eyes. The mother stated her inability to satisfy herself as to whether the child was really sensible to light. She often placed a lighted candle before the eyes, but thought no notice was taken of it. The child was, at this time, very delicate in appearance, and its health very indifferent. It seemed doubtful, too, if the retina was possessed of its appropriate sensibility. Had the health improved, and some evidence of the sensibility of the retina become apparent, I purposed to have operated for the removal of the cataracts. The little patient, however, was not brought again after this time, so that I imagine it must have been carried off by *marasmus* or some similar affection.

Cases are also recorded in which the cornea was overlapped by the sclerotics, to such an extent as to leave only a very small transparent portion opposite the pupil.

*Hypertrophy.*—It occasionally happens that the cornea becomes much enlarged, and very prominent generally, and therefore without undergoing any particular change of form,—a condition which has been termed *staphyloma pellucidum sphericum*. It is usually an accompaniment of *hydrophthalmia*, of which I shall say more hereafter.

*Atrophy.*—More frequently a change of an opposite kind is noticed, the cornea becoming exceedingly diminished in size and flattened. This condition is often noticed after severe injuries, or long-continued inflammatory action, terminating in greater or less diminution of the size of the globe generally.

*Fungous Growths* are sometimes observed to arise from the surface of the cornea: they do not materially differ from those of the conjunctiva, and are to be treated in the same manner, viz., by excision.



## SECTION X.

## INJURIES OF THE CORNEA.

I have before alluded to the subject of injuries of this texture, when speaking of those of the conjunctiva. Inflammation, occurring after injuries, is to be combated in the manner before explained.

*Wounds* of the cornea, if effected with sharp instruments, and untended with much contusion, often heal rapidly. Thus, the incision made in extracting a cataract is often healed in less than twenty-four hours; and wounds of this description, which do not penetrate the anterior chamber, are of little moment, except that they are apt to leave a slight degree of opacity. If the anterior chamber be perforated by the incision, the aqueous humour will usually have been evacuated, and occasionally it will happen that a portion of the iris is entangled in the wound. Gentle friction, employed through the lid, or the application of bright light, will generally cause it to recede, if it have not already become adherent. I have several times known instances of portions of the iris becoming adherent to the internal surface of the cornea in this way, which have been liberated without interference, and after an interval of many days. In these cases, when the iris is adherent at a point near to the centre of the cornea, we are advised, as in cases of ulceration, to apply the extract of belladonna, with a view of causing the retraction of the strangulated portion. I imagine, however, that when this result follows the use of that substance, it would be effected independently of its application, by the natural motions of the iris.

When a wound of the cornea has been caused by a sharp instrument, it will usually heal, as I have said, without difficulty; and all the treatment that is necessary in such a case is to keep the eye-lids as nearly as possible in a state of repose, which may be effected either by strapping them down with adhesive plaster, or applying a compress and bandage over them; the latter being, also, carried lightly around the head. The same principle is equally applicable to injuries of a slighter kind, such as a scratch from a thorn, pin, or other sharp substance. If blunt instruments have caused the mischief, particularly when accompanied with much force, it often happens that considerable ulceration takes place, and sometimes alonging

is produced. When either of these processes occurs, it is best to apply the nitrate of silver to the injured surface, with a view to induce a more healthy action.

CASE.—M. A. W., aged 20, was admitted an out-patient of the Manchester Eye Hospital, November 30th, 1841. About ten days before admission she received an injury from a pin, which had accidentally come in contact with her right eye. On examination, the organ was found to be in a state of great irritation, the conjunctiva and sclerotica both highly vascular, more especially the former, and the central portion of the cornea appeared to be slightly abraded of its conjunctival covering and somewhat opaque. The irritation had not extended to the deeper seated textures. She complained of intense pain in the eye and whole orbital region, great intolerance of light, profuse lachrymation, and very imperfect sight. She had been under the care of a surgeon, who had bled her freely from the arm, applied cupping-glasses to the temple and a great number of leeches around the eye, and administered strong purgatives and the like, without affording her the smallest amount of relief. She was a spare and rather delicate girl, and appeared much reduced by the treatment employed. She was ordered to take half a grain of opium with two grains of calomel every six hours, and to apply the extract of belladonna freely around the eye. A purgative was also ordered to be taken occasionally. On the 3rd of December, the pain had somewhat abated, but was still very severe, and the vascularity but slightly diminished. As the wounded part of the cornea appeared still to have an irregular and abraded surface, I determined to treat the case simply as one of injury of that texture. The eye-lids were accordingly closed with strips of court-plaster, and she was directed to do nothing more until her next visit, except merely to take an aperient every other morning. Four days afterwards, she stated that the relief she had experienced was very great; the pain was much mitigated, but there was still a considerable amount of vascularity of the external tunics; the cornea had lost much of its irregular and abraded appearance, and was evidently in a healing condition. On the 26th, there was very little uneasiness about the eye, slight chronic inflammation of the conjunctiva, and an opaque spot on the centre of the cornea,—the site of the original wound. Vision continued rather impaired. The sulphate of copper, in substance, was applied to the inner surface of the lower lid, and a solution of the same salt was directed to be applied to the eye two or three times daily. After this time, she continued to attend occasionally; the same treatment was persevered with, the opacity of the cornea diminished, and vision became almost as perfect as before the accident.

Sometimes fragments of steel, of considerable size, and other substances, such as thorns, splinters, &c., are found sticking into the substance of the cornea; and they will, in some cases, even penetrate the anterior chamber.

When they can be removed, it is better that this should be done may usually be effected with the aid of a small forceps. In some instances it may be necessary to employ a lancet or cornea-knife, in order to remove these foreign matters, particularly when they are imbedded in the substance of the cornea.

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## CHAPTER III.

## DISEASES OF THE SCLEROTICA.

The sclerotica, like other fibrous tissues, is but feebly organized, exhibits no appearance of blood-vessels, and possesses but little sensibility. Moreover, its function is merely protective, since it is only a case, or covering, for the defence of the more delicate and transparent textures which it surrounds; accordingly, as in this class of textures generally, it is but rarely found to be the seat of morbid action. But, as the sclerotica, undoubtedly, possesses a certain amount of vascularity, it is, therefore, liable to be attacked by inflammation.

## SECTION I.

## SCLEROTITIS, OR INFLAMMATION OF THE SCLEROTICA.

*Symptoms.*—Inflammation of the sclerotica is a somewhat rare affection; the symptoms which denote its existence are not materially different from those observed in the other forms of ophthalmia, such as increased vascularity, intolerance of light, lachrymation, and pain in the organ and contiguous parts, modified, somewhat, in the manner I shall proceed to explain.

*Peculiar appearance of the vessels of the sclerotica when inflammation exists.*—The vessels discerned upon the surface of the sclerotica, as I formerly noticed, are of a *pale rose*, or *pink* colour, deep-seated, few in number, and somewhat tortuous towards the periphery of the eye-ball, but exceedingly numerous and minute, and run in *straight lines* as they approach the margin of the cornea; whereas, those of the conjunctiva are of

a *deep-red*, or *carmine* colour, superficial, moveable with the loose conjunctiva, and generally *tortuous*, or *reticulated* throughout.

But it is not to be imagined, as is commonly stated, that, when those pink-coloured vessels are observed, there is necessarily scleratitis present, for they are frequently noticed *traversing the surface of the sclerotica when that tunic is free from disease*. A large proportion of these vessels are destined to convey blood into the interior of the eye,—to the iris; and hence, they may display a considerable amount of excitement without the sclerotica being necessarily implicated in their disordered action. The iris, it will be recollected, has its vascular supply from two sources, viz., from the internal and external ciliary arteries. The internal, (long) ciliaries run between the choroid and sclerotica, and give off very few, if any, branches in their passage; so, likewise, the external ciliaries pass between the sclerotica and conjunctiva, and also give off but very few branches. The sclerotica itself is, probably, chiefly supplied from the vessels of the choroid, which may be seen to run from the latter into the former membrane; but, there can be little doubt that the sclerotica likewise receives some branches from the external ciliaries, particularly at its anterior portion, where these vessels penetrate it in their passage to the interior of the globe.

The fact that these vessels perforate the sclerotica, which they do just posterior to its junction with the cornea, sufficiently explains the reason why they are always so strikingly developed in cases of iritis; and we can readily understand that scleratitis can hardly exist without their being similarly excited. But these are not the only morbid conditions in which the pink-coloured vessels are observed; they frequently become visible after conjunctivitis has existed for some time; thus, it is very common to notice them in protracted cases of catarrhal and strumous ophthalmia, and even after injury of the conjunctiva and cornea. This is accounted for, by the free anastomosis of the two classes of vessels in front of the eye; and it often happens that increased action in the superficial vessels is in this manner communicated to those deeper seated. In such cases, however, we shall be no more justified in saying that scleratitis exists than we shall in saying that there is iritis also; it is true that, in many cases, we may regard the presence of these vessels as exhibiting a tendency to the extension of morbid action to the sclerotica, or the iris. More than *this* cannot be asserted, except the diagnostic marks of scleratitis, or of *iritis, be actually present*.

Inflammation, indeed, is not readily induced in fibrous tissues ; and, therefore, these pink-coloured vessels may remain in a state of excitement for a considerable time, without the sclerotica taking on the same morbid action. When sclerotitis actually exists, it is indicated, not merely by the pink-coloured vessels on the surface of the membrane, but also by its *whole anterior portion, as far as the margin of the cornea, becoming stained of a deep pink, or even of a lead colour.* But, if these vessels are very numerous and highly injected, as in a case of iritis, without the sclerotica itself being the seat of inflammation, the surface of that membrane retains its colourless appearance, and there is also a clear white space between the point where the vessels penetrate the globe and the margin of the cornea : this condition gives to the front of the eye the appearance of a vascular wreath or zone, of a pink or rose colour. On the other hand, if the pink-coloured vessels are observed without any coloration of the sclerotica, and without the pink zone, we may usually be satisfied that neither sclerotitis nor iritis exists.

*Intolerance of light* and *lachrymation* are also, in general, marked symptoms of sclerotitis ; whether they arise directly from the inflamed condition of the sclerotica, or are to be attributed to the inflammation of the conjunctiva and cornea, that so generally accompanies it, is not very material. They are, at all events, almost invariably observed in the acute stage of sclerotitis ; indeed inflammation of any portion of the visual organ but rarely exists without the presence of these symptoms : the intensity with which they present themselves varies exceedingly in different persons, probably depending upon the amount of irritability of the individual affected.

The *pain* which is experienced in sclerotitis differs considerably from that observed in ordinary conjunctivitis. In the latter affection, the uneasiness complained of is usually compared to that produced by the presence of a foreign particle in contact with the surface of the eye ; whereas, in sclerotitis, the pain is generally of a dull, aching, or of a pulsating character, often coming on at night and disappearing in the morning. There is likewise considerable tenderness to the touch usually experienced, on pressing the finger upon the globe through the upper lid. In sclerotitis, too, there is generally more pain in the circumorbital region, and frequently hemicrania. To the character of the pain which the patient experiences, rendering his nights sleepless and unrefreshing, it is probably owing that

the general system sympathizes to a much greater extent in this affection than in conjunctivitis. Hence, too, it is that the patient is usually irritable, feverish, and otherwise disturbed in health.

It rarely happens, when the sclerotica is acutely inflamed, that the morbid action is limited to that membrane. In almost every case, owing to the free anastomosis of the vessels, there is more or less conjunctivitis present, and the cornea is also very frequently affected, as shown by its vascular, nebulous, hazy, or even ulcerated condition. The affection of the cornea, whatever its nature may be, is usually in proportion to that of the conjunctiva, upon which it ordinarily depends. It will, however, occasionally happen that a hazy condition of the cornea is found in combination with a case of (otherwise) pure scleratitis.

In other instances, the disordered action spreads internally, and the iris, in particular, is very liable to become the seat of inflammation during the progress of scleratitis, its presence being evinced by the contraction, sluggish movement, or irregular shape of the pupil, change of colour of the iris, opacity of the capsule of the lens, or, in some instances, secretion of pus into the anterior chamber. Indeed, in a case of scleratitis, there is the same disposition in the iris to take on the inflammatory action, as is observed in the cornea when conjunctivitis exists, and for a like reason, viz., that the vessels traversing the sclerotica are mainly distributed to the iris, as those of the conjunctiva run into the texture of the cornea.

*Causes.*—Scleratitis is thought to be most commonly induced by exposure to cold, such as draughts of cold air, damp air, easterly winds, and the like; and in some instances, it results from injury to the eye. The probability is, that the causes of scleratitis are the same as those which excite conjunctivitis. In different individuals, we see that exposure to the same morbid agents will produce disordered action in different textures, some having the mucous, others the serous, and others, again, the fibrous tissues affected. The peculiarity is caused by certain states of the constitution which predispose a certain order of parts to be affected by disease in preference to other parts. Thus, in the affections of the eye, the conjunctiva is apt to participate in the morbid states of the cutaneous and mucous membranes, as I have before pointed out; whilst the sclerotica is more likely to be the seat of active disease in persons in whom the fibrous and tendinous structures frequently suffer, such as rheumatic individuals. On this account scleratitis is often termed *rheumatic ophthal-*

*nia*, just as pustular conjunctivitis is sometimes called strumous ophthalmia. There is no objection to the use of this term, when applied to the disease in individuals who are, or have recently been, suffering from rheumatism in other parts of the system; but it is obviously improper thus to designate all cases of sclerotitis, indiscriminately, since the disease is frequently witnessed in persons who have never had an attack of rheumatism.

Gouty subjects are also liable to be affected with sclerotitis, and hence the term *arthritic ophthalmia* is sometimes made use of. It sometimes happens, too, that persons who have *gonorrhœa* are subsequently attacked with an inflammatory affection of the joints and other fibrous tissues, and that the sclerotica and iris participate in the morbid action. Mr. Lawrence and Sir B. Brodie have given reports of cases of this description; but, as they do not differ from ordinary cases of inflammation of the sclerotica, extending to the iris, it is obviously unnecessary to enter into a particular account of them. It is quite proper, however, that we should be aware that *sclerotitis may be excited by gonorrhœa*; and the knowledge of such a fact most clearly exhibits the impropriety of regarding sclerotitis as exclusively rheumatic, or arthritic ophthalmia, particularly as the anatomical characters of the affection are always the same, whether it be excited by cold, by injury, or by extension of rheumatic, arthritic, or gonorrhœal disease.

It is a curious circumstance that, while some writers consider sclerotitis as synonymous with rheumatic ophthalmia, and that while this disease has been elaborately described in a variety of ways, a recent author (Velpeau) has boldly asserted that there is no such disease at all,—that inflammation of the sclerotica is never witnessed!

The chief objections brought against the existence of sclerotitis, by M. Velpeau, are three in number. The first relates to the fact, which I have pointed out, that the pink-coloured vessels do not properly belong to the sclerotica. The second is, that the vascularity is limited to the anterior portion of the membrane. The last objection is, that no trace of the results of inflammation ever remains in the sclerotica after the cessation of the presumed inflammatory action, such as thickening or deposition into its texture.

With respect to the first of these objections, I have said that these vessels are principally distributed to the iris. At the same time, however,



it cannot be doubted that branches from them are given off into the substance of the sclerotica, and therefore that that membrane frequently participates in the morbid action of the communicating vessels on its surface; and this is ascertained, as I have already shown, by the coloration which the sclerotica presents when it is the seat of inflammation.

The second objection, that the vascularity is limited to the anterior portion of the sclerotica, must also fall to the ground, because the vascular pink zone is really not characteristic of scleratitis, but of iritis, the coloration of the sclerotica generally being necessary to constitute inflammation of that texture.

The last objection urged by this author, viz., that none of the usual traces of inflammation are ever witnessed in the texture of the sclerotica, such as thickening, is equally untenable with the others. Every one, who has paid a moderate degree of attention to ophthalmic diseases, is well aware that a considerable alteration in the texture of this membrane does frequently result from long-continued and severe attacks of inflammation. It is quite true that we never observe thickening or deposition; neither do we observe ulceration. The alteration of structure that occurs is of a different kind, viz., attenuation or absorption; and the sclerotic coat, after severe and long-continued inflammation, frequently becomes thinned, so as to allow the colouring matter of the choroid to be distinctly seen through it; and indeed, in some instances, it gives way to such an extent as to admit of a protrusion of a sufficient portion of the choroid membrane to form a tumour of considerable size, and which I shall describe in the next section.

*Treatment.*—Inflammation, when confined to the sclerotica, is, like conjunctivitis, a comparatively unimportant affection, as that membrane is in nowise connected with the proper function of vision. But, nevertheless, as the inflammatory action is very apt to extend to the iris, and thus induce contracted pupil, or opacity of the capsule of the crystalline, it is always desirable that its progress should be arrested by every suitable means.

Now, in inflammation of the deeper-seated textures, a different class of remedies becomes necessary from those I have previously advised for the treatment of most of the inflammatory affections of the conjunctiva and cornea, and this more particularly in the first instance.

*Antiphlogistic Remedies.*—In the early and acute stage of scleratitis,

en, I should recommend the employment of those remedies generally called antiphlogistic; such as general and local blood-letting, the free exhibition of purgative and nauseating medicines, and abstemious diet, together with repose of the organ. This treatment, however, it is rarely necessary to push to any great extent, particularly if the morbid action be confined to the sclerotica, and does not appear likely to extend to the iris. In most cases, the abstraction of blood topically, by the application of leeches to the palpebræ, or the cupping apparatus to the temple, or to the nape of the neck, will answer every useful purpose; and the quantity to be removed must be regulated by the peculiarities of the individual case, such as the continuance and severity of the attack, the sex, age, and physical power of the patient, and the like. A free action of the bowels also to be maintained by the exhibition of purgatives, of which substances calomel should be preferred in the first instance. Colchicum, stimonials, and such other medicines as act more particularly upon the liver and kidneys, the warm bath, and mustard pediluvia, are also in some cases serviceable, and more particularly in those which appear to be of a spasmodic character.

As the pain is usually much increased during the night, it will be proper to prescribe an anodyne to be taken at bed-time; and, for this purpose, one or two grains of opium, with a similar quantity of calomel, made into a pill, will be very suitable. The pain is often much relieved, likewise, by the employment of extract of belladonna, which should be liberally applied around the orbital region. The application of the belladonna is so beneficial in producing a dilated state of the pupil, a condition which is always important to maintain during the existence of scleritis; because, if the inflammatory action extend to the iris, the mischief is then usually not so great. Opiate frictions may become necessary if the belladonna should not be sufficient to relieve the pain: some practitioners use a scurial ointment in combination with opium; others a mixture of iodine and extract of belladonna: either of these may be rubbed freely upon the palpebræ.

Local applications to the organ itself are useless in the early and acute stages of scleritis; but we may, in some instances, prescribe a fomentation of poppies, or a solution of the extract of belladonna, to be used in a mild state. Cold applications should be prohibited.

If symptoms of iritis supervene, (and we should always be particularly observing the condition of the iris,) we must immediately commence the free employment of mercury so as to produce its full effect on the system, or until the morbid action is arrested. Otherwise, the particular indication for the exhibition of mercury in the treatment of scleratitis.

*Stimulant and Tonic Treatment.*—I have said that during the early and acute stage of scleritis, antiphlogistic treatment is the most proper. But depletory remedies, particularly blood-letting, cannot be properly continued beyond a certain time. If the morbid action remains unsubdued after the continuance of antiphlogistic treatment for two or more weeks, its further employment will avail but little. Indeed, it can be no doubt that, after the lapse of time I have mentioned, such a treatment will prove injurious to the system at large, and thus tend to bring it to a state of morbid excitement, in which the eye is sure to partake. Besides, in delicate persons, in whom such cases are most frequent, with, it is obvious that depletory measures must be sparingly employed.

The morbid action, then, having continued for a certain time, and we have arrived at the *subacute* or *chronic* stage, it will be better to make a decided change in the treatment. In those instances, likewise, in which the disease is of a less active character from the first, particularly in persons of a feeble constitution, depletory measures will scarcely be needed. In such cases, all events, must be sparingly employed.

The internal exhibition of tonics and mild stimulants will, in such circumstances, be proper. With this view, an infusion of some bitter, such as gentian or cascarilla, combined with carbonate of ammonia; an infusion of roses, with sulphuric acid and sulphate of iron; or some chalybeate preparation, such as the *mistura ferri composita*, may be prescribed according to the peculiarities of the case. Such a treatment, in short, both medicinal and dietetic, as are best calculated to impart energy to the system will be most suitable.

The employment of local stimulants will now also be of decided service. For this purpose, and more especially if the conjunctiva and cornea participate in the inflammatory action, it will be proper to touch the surface of the inferior lid lightly with nitrate of silver in substance. This may be repeated every three or four days. A weak solution of

or of sulphate of copper, may also be applied to the conjunctival surface, by means of a camel-hair brush, two or three times a day; and the red precipitate ointment may be used at bed-time.

If the disease have existed several weeks without having extended to the iris, we may presume that there will not be much danger of such extension; but still, it will be proper to continue the local application of belladonna, so as to allay irritation and keep the pupil dilated.

Counter-irritation by means of blisters, or tartar emetic ointment, applied alternately to the temple, behind the ear, or to the nape of the neck, I am inclined to consider, in some instances, as an useful auxiliary.

Scleratitis generally proves a somewhat intractable disease, and notwithstanding the persevering exhibition of the various remedies I have mentioned, though they may, and usually do, produce a decided mitigation in the severity of the symptoms, they rarely, if ever, put a sudden stop to the morbid action, which often continues for a period of several months, in defiance of the most energetic treatment.

**CASE 1.**—Miss B., six years of age, of a delicate constitution, was brought to me on the 6th of September last. Her left eye had been slightly inflamed for several weeks previously, but within the last few days the disease had assumed a somewhat more active character. There was much intolerance of light, lachrymation, and considerable uneasiness about the eye. On examining it, there was a diffused pink colour observed all over the surface of the sclerotica; and the vessels were numerous, straight, and very minute. There was none of the red superficial vessels visible, but the centre of the cornea, about one third of its entire surface, was very dull and hazy, imparting to it much the appearance of ground glass. The pupil was dimly perceptible through the clouded cornea, and was not abnormally contracted, nor did the iris seem implicated in the morbid action. Vision was much obscured. Four leeches were directed to be applied around the eye; a poppy fomentation to be used frequently; and three grains of calomel to be taken every night. Four days afterwards, the eye had much improved in appearance, the vascularity diminished, the uneasiness, lachrymation, &c., mitigated, and vision much improved. The mouth had become rather sore. The fomentation was ordered to be continued; the calomel to be omitted, and instead, a draught of infusion of senna to be taken every second or third morning. At the end of the fortnight, the eye had regained its normal appearance and vision was quite restored.

**CASE 2.**—Mrs. F., æt. 36, had been suffering from an affection of both eyes upwards of two months prior to my seeing her. The disease commenced in the right, which had been the worst throughout. She had never before been the subject of any ophthalmic affection. When she first consulted me, the right eye was

exceedingly vascular, the vessels being principally deep-seated, of a pink colour, and particularly numerous within a short distance from the margin of the cornea, and the sclerotica generally appeared of a deep leaden hue. A few of the red superficial vessels were also discernible, more especially at the superior part of the eye-ball, where they were clearly traceable on to the surface of the cornea. Several superficial nebulous opacities were also observed in various portions of the cornea. The pupil was slightly contracted, but there was no appreciable change in the structure or colour of the iris, nor any opacity of the capsule of the crystalline. The eye was extremely sensitive to light, and there was a considerable amount of lachrymation. The left eye presented precisely similar phenomena, but in a less intense degree. There was but little pain in the eyes during the day; but she was in the habit of being awake at a very early hour in the morning, and thereby kept awake for a considerable time. She had had no medical advice, but had used several simple remedies without relief. Her general health was rather delicate, being often troubled with a spasmodic affection in the stomach, flatulence, and indigestion; and complained at that time of flying pains about the shoulder and neck of the right side, unattended, however, with febrile excitement. She was the mother of several children; the youngest being about a year old, and suckling. In this case, neither the general condition of the system, nor the local affection, appeared to me to indicate the necessity of adopting depletory treatment. Accordingly, I recommended the infant to be weaned, and, with a view of strengthening the constitution of the patient, prescribed an infusion of columba with sulphate of quina; at the same time advising a moderately nutritious diet, with a little fermented liquor, or brandy and water. A small dose of calomel and colocynth was directed to be taken occasionally, so as to keep up a gentle action of the bowels. For the local treatment of the organ, I applied the nitrate of silver in the usual manner; at first every three or four days, and afterwards once a week; recommending also a solution of extract of belladonna to be freely applied to the palpebræ and eye-brows during the day, and the red precipitate ointment to be introduced within the margins of the lids at night. A blister was also ordered to be applied alternately to the temple and behind the ear of the right side. Under this treatment, a decided improvement was speedily observed, all the symptoms gradually subsiding. It was full three months, however, before the morbid action had entirely ceased in the right eye; but vision was completely restored at the expiration of that period.

*Of the Combinations of Scleritis.*—It is the custom of some authors to describe, under separate heads, certain complications of scleritis, to which I have already briefly alluded. Thus, some give an elaborate account of conjunctival inflammation in combination with scleritis, under the denominations of *catarrho-rheumatic ophthalmia* and *conjunctivo-scleritis*. Now, the disease thus described is nothing more than an aggravated attack of conjunctivitis, in which the pink-coloured vessels be-

come developed. I have already stated that the appearance of these vessels is not in itself diagnostic of scleratitis; and, if the latter disease were actually to come on during the progress of conjunctivitis, where is the use in giving a separate title and description to a combination of disease which always exists, more or less, in every case of inflammation of the sclerotica? For it very rarely happens, as I have before stated, that this affection is present without the conjunctiva and cornea participating to a considerable extent.

So likewise, when the inflammatory action extends from the sclerotica to the iris, which is a frequent occurrence, the affection has been denominated, and separately described, as *sclero-iritis*. No practical good can possibly result from this additional name and description, because iritis is so much more important an affection than scleratitis, that the latter is passed over, and the attention of the practitioner is engrossed with the former. So that all that can be necessary to mention with respect to this complication, so far as it may have been overlooked when speaking of scleratitis, will be adduced when treating of iritis.

These endless subdivisions are extremely prejudicial to the progress and diffusion of ophthalmic science, for nothing is so forbidding to the student as this multiplication of useless terms and unnecessary descriptions. If this practice be continued, we may presently expect an elaborate account of *corneo-conjunctivitis*, *corneo-sclero-iritis*, and a few other equally irrational names and descriptions of disease.

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## SECTION II.

### STAPHYLOMA SCLEROTICÆ.

The sclerotica not being very frequently the seat of inflammation, and nothing analogous to the process of ulceration being observed therein, it is not very common to meet with a staphyломatous condition of that tunic. I have before stated that it is occasionally observed in combination with a similar condition of the cornea; but it now and then comes under our notice, independently of any affection of that texture.

Staphyloma is usually a sequel of long-continued inflammation of the sclerotica, but it is sometimes the result of a wound or rupture of the

fibrous coat of the eye. In the former case, the inflammatory action has been followed by a process of absorption, which causes the sclerotica to be much attenuated, so that the colouring matter of the choroid is seen through it, and hence it acquires a dark blue tint. In some instances, this is general; in others, only partial. When the attenuation is partial, the membrane is apt to give way at that particular point, and to allow of a portion of the choroid, and other contents of the posterior chamber, to bulge forward within its concavity; and, in this way, a tumour is formed which projects from the general surface of the eye, and gives rise to considerable irritation.

A staphylomatous condition of the sclerotica is most frequently noticed, at its anterior part, near to the margin of the cornea. The reason probably is, that the sclerotica, at this point, is much thinner than at its lateral and posterior portions, and therefore gives way with a less amount of disease. At this point, it is also more liable to be attacked by inflammation, in consequence of its greater vascularity.

When staphyloma results from a wound or rupture of the sclerotica, it is owing to two circumstances: first, the choroid projects forward between the lips of the wound, and thus tends to prevent the union of the divided portions; and secondly, there is a general indisposition in wounds of the sclerotica to unite, which facilitates the protrusion of the choroid.

Staphyloma scleroticæ, I have said, is an occasional result of inflammation of that coat. It is, however, but rarely the consequence of idiopathic scleritis; for I have more commonly witnessed it in connexion with deep-seated, internal inflammation of the globe, in which the choroid was probably largely implicated and which had extended to the sclerotica.

The size to which staphylomatous tumours of the sclerotica arrive is somewhat variable. I have seen them, in some cases, as large as a mulberry; in others about the size of a bean. Most commonly, the disease is confined to one eye, and but a single tumour is seen; but, on some occasions, both eyes are the subject of this disease, and more than one tumour is observed in either eye.

With such an amount of disorganization, we can scarcely expect that there will be any useful sight remaining; and, although, in some instances, there may be partial vision existing, yet generally the retina is so much implicated that blindness is an usual result.

*Treatment.*—The treatment of staphyloma scleroticæ, like the same

affection of the cornea, is to be regulated by the presence or absence of irritation, and the amount of deformity. If there be no uneasiness produced by the tumour, it may be a question whether any interference will be necessary, as it occasionally happens that this condition of the eye, after a certain time, is followed by a considerable degree of atrophy or absorption. When the tumour is very large, some advise that it should be punctured, with a view to its temporary diminution; and, in many cases, this operation is followed by atrophy. Others have recommended the extirpation of the eye; and, there can be no doubt that this operation has been frequently performed for the disease, under the impression of its being decidedly malignant. Such a proceeding, however, can never be required.

*Operation of Sinking the Eye.*—The most important question in the treatment of this disease, as in staphyloma of the cornea, is, in the case of one eye only being affected, whether or not there is reason to apprehend its extension to the other. If such a result should seem probable, then the same operation should be performed as for staphyloma of the cornea, *with a view to the complete sinking of the organ.* Properly to effect this, it is necessary to excise the entire cornea, or at least a considerable part of it, and, in some cases, the projecting portion of the sclerotica also.

Sometimes, when the suffering of the patient is very great, this circumstance alone would justify us in recommending this operation; and we need not hesitate when the eye is disorganized, and vision totally destroyed, because the appearance would not be made worse, and an artificial eye might be afterwards worn. Indeed, the irritation produced by a tumour of considerable size projecting from the surface of the eye, is sometimes so great and uninterrupted, that, simply regarded as a means of speedy relief, the operation is every way desirable. If left to itself, the irritation might continue many weeks or months, and without being much influenced by ordinary remedies, before the cessation of the morbid action, or before the commencement of atrophy; whereas, by the operation of sinking the eye, in all probability, the patient would be materially relieved in the course of a few days, and all suffering and risk of extension of the morbid action to the sound eye speedily at an end.

The operation, performed under these circumstances, is, undoubtedly, a more formidable undertaking than in a case of staphyloma of the cornea. The front of the eye is sometimes but little affected, the cornea, perhaps,



retaining its healthy appearance; there is often considerable inflammation of the globe present, and the sensibility is morbidly excited. The pain which the patient experiences during the operation, is greater than when the organ is comparatively tranquil and free from inflammation, as it is in most of the conditions requiring operative proceedings. In performing the operation, therefore, under these circumstances, it is desirable for the surgeon to be extremely rapid in his movements.

As an illustration of the kind of case to which I more particularly refer, as fitted for this operation, I will relate the following example.

CASE.—J. R., a young man about 30 years of age, applied to me for advice under the following circumstances. He had been suffering from inflammation of the right eye occasionally, during the last twelve months, for which the usual remedies had been employed with temporary relief. For six months past, vision had been totally destroyed; but it was only during the last five or six weeks that he had suffered much pain. On looking at the eye, the vascularity was observed to be very considerable, more particularly in the sclerotics, as denoted by the presence of numerous pink vessels, and a general dark purplish colour of that membrane. There was likewise a considerable bulging of the sclerotic coat under the superior lid, and not far from the margin of the cornea, forming a tumour of the size and appearance of a mulberry. The cornea was perfectly transparent, but somewhat diminished in size; the iris and pupil were invisible, the anterior chamber being apparently full of blood. His sufferings during the last two or three weeks had been excessive, the pain having been seated in the eye-ball and surrounding parts, and not having been relieved by the use of leeches, snodynes, and the like. Pain and want of sleep had reduced his strength very materially, so that he fainted on the least exertion. The left eye was also intolerant of light and watery, but exhibited no morbid appearance. In this case it was quite evident that the eye was destroyed for all the purposes of vision; medical aid, too, had been ineffectual. Under these circumstances, it appeared to me that the speediest method of relieving the patient's sufferings, and, at the same time, the one most likely to prevent the extension of the morbid action to the sound organ, would be by sinking the diseased one. The patient readily consenting, I made a section of the cornea with a cataract knife, so as to embrace the lower half of its circumference, the flap being immediately laid hold of with the forceps, and the scissors employed, so as to sweep off the whole of the cornea at one stroke. The humours escaped, together with a portion of fluid blood, and the organ became perfectly flaccid. Strips of adhesive plaster were then applied so as to keep the eye-lids closed. A draught, containing forty drops of landanum, was given, and a poultice directed to be applied, if he should have much pain. The suffering, which was rather severe during the operation, soon subsided, and he was enabled on the succeeding night to sleep soundly, which was the first time

he had done so for several weeks. His recovery was rapid. At the expiration of a fortnight the remaining portion of the organ was perfectly free from irritation, very much reduced in size, and without any projection from its surface, the wound having healed over.

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### SECTION III.

#### INJURIES OF THE SCLEROTICA.

Sometimes the sclerotic coat is ruptured by severe blows on the eye, when there is generally a protrusion of the choroid, and occasionally of the iris, retina, and even of the crystalline and vitreous humours. I have witnessed frequent instances of each of these results. Most commonly the conjunctiva remains entire, and the protruding substance is placed immediately under it. A frequent source of this description of injury, in this neighbourhood, arises from the power-loom shuttle being propelled against the organ, which it usually is, with great violence. A similar result, however, is often brought about by blows with the fist, sticks, and sometimes by sharp instruments. The immediate treatment of these injuries should be that of bringing the lids in contact, and retaining them in that position by strips of adhesive plaster, or a compress and roller. In the case of the lens, however, being projected between the sclerótica and conjunctiva, an incision should be previously made into the latter membrane, so as to admit of its escape. Inflammation must be kept down by the employment of antiphlogistic treatment. In some instances the wound of the sclerótica unites, and the protruded membrane recedes. More frequently, however, a staphylomatous tumour remains, which, if small, may be treated by the occasional application of nitrate of silver, which sometimes causes it to shrink. If the inflammation be severe, and the protrusion considerable, as it often is, a condition of the organ may be induced similar to that in which I before recommended the sinking of the eye; and that operation I have likewise performed in cases of this description from injury, with the like beneficial results. After such severe lesions, as those to which I now allude, it usually happens that vision is destroyed.

## CHAPTER IV.

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### DISEASES OF THE IRIS.

The iris, beyond all question, exercises an important influence in the economy of vision. Regulating the number of luminous rays to be admitted into the interior of the eye, and for this purpose possessing a muscular apparatus, capable of contracting or enlarging its pupillary aperture, according to the varying intensity of the light, any morbid process which interferes with the due exercise of its function, must necessarily be prejudicial to the perfection of sight. Structures which are destined for rapid movement are always endowed with a high degree of vascularity, as well as of a refined sensibility; and the iris is therefore liable to be affected by the various morbid agents which act on the vascular, nervous, and muscular tissues.

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#### SECTION I.

##### IRITIS, OR INFLAMMATION OF THE IRIS.

Inflammation is the most frequent morbid condition to which the iris is subject, and, when affecting this structure, it is named *iritis*, or *iriditis*.

*Symptoms.*—The more prominent symptoms of iritis I have enumerated on several previous occasions. Those most commonly noticed are the peculiar vascular pink zone on the surface of the sclerótica; contraction, immobility, and irregularity in the shape of the pupil; deposit of opaque matter on the capsule of the crystalline; alteration of the colour of the iris; pustules or tubercles on its anterior surface; and effusion of pus, or other fluid, into the anterior chamber.

These are the leading symptoms which characterize the presence of

iritis. There are others likewise ordinarily present, which are observable in most inflammatory diseases of the eye, such as lachrymation, intolerance of light, and pain in the organ and surrounding parts! I shall make a few observations on each of these phenomena, in the order detailed.

*The Vascular Zone.*—I have already explained that the pink vessels observed in a case of iritis, are those which pass between the conjunctiva and the sclerotica, and perforate the latter texture just posterior to its junction with the cornea, and which are called the anterior ciliary arteries. These vessels are few in number at the periphery of the eyeball, and of moderate size; but, as they approach the cornea, at a distance of a few lines from it, they subdivide, and become exceedingly numerous and minute, and have a radiated appearance. At the distance of about a line from the margin of the cornea they cease to be visible, as at this point they perforate the sclerotica in their passage into the interior of the eye. These vessels, when fully developed, as I have said, are exceedingly numerous at the distance of from one to three or four lines from the margin of the cornea; and as they are discernible at the like distance all around the anterior part of the sclerotica, they form a ring or zone, which is exceedingly striking, and constitutes what is termed the *pink zone*. As they perforate the sclerotica at a little distance from the cornea, there is, consequently, a clear, white space intervening, forming the white circle or zone which, by some writers, has been erroneously termed the *arthritic circle*. The red zone, which I formerly described as occurring in some cases of corneitis, is formed by a band of red conjunctival vessels running upon and around the margin of the cornea. I mention this last, again, for the purpose of contrasting it with the others, and impressing their differences more forcibly on the memory.

In some instances, these different circles are well marked and very striking; in others they are but partial, and therefore less obvious. In the more acute cases of iritis, the pink zone is generally well-defined and clear; but, in those of less intense character, it is not so apparent. The white circle depends for its existence upon the presence or absence of the red conjunctival vessels. If there be conjunctivitis present, the superficial vessels reaching to the border of the cornea, it is obvious that the white circle will be imperceptible. If the conjunctivitis be partial, we may then find that the upper or lower half of the circle is observable, whilst the remaining portion is obscured by the red vessels; and thus we may

notice either a complete or partial circle, or an absence of it altogether. Indeed, conjunctival inflammation sometimes occurs to such an extent as completely to mask the appearance of the vessels underneath. So, also, if scleratitis exist in conjunction with iritis, it will be seen that the coloured and vascular condition of that texture surrounding the cornea, will prevent the white circle from being apparent. And these I believe to be the conditions which determine the presence or absence of these different zones, about which so much has been said.

*Condition of the Pupil.*—An *undue amount of contraction of the pupil* is often one of the earliest indications of inflammation of the iris. At the same time we must bear in mind, that a rather contracted state of the pupil is the normal condition of that aperture in very many individuals. Nevertheless, if (in addition to the vascular state of the eye previously described,) the pupil is observed to be inordinately contracted, and not to expand under the influence of diminished light, we may be sure that inflammation of the iris has commenced. But this condition alone is not decisive of the existence of iritis, because the pupil is often considerably contracted in acute external ophthalmia, in consequence of the iris participating in the morbid sensibility of the whole eye. When there is, at the same time, *irregularity in the shape of the pupil*, this is likely to prove a more correct diagnostic of the presence of iritis.

If the pupil be fixed in the contracted state, and incapable of dilatation, it usually arises from adhesions having formed between the posterior surface of the iris and the capsule of the crystalline; which textures, it will be remembered, are very nearly in contact, being separated only by a very minute quantity of fluid. Now, the surfaces of the iris, both anterior and posterior, are formed by a fine membrane of the serous class, which is continued on to the surface of the capsule, and is supposed to secrete the fluid called the aqueous humour. This membrane is perfectly analogous to the other serous tissues, such as the pleura; and we find that, when it is inflamed, lymph is thrown out, and adhesions are formed between the opposing surfaces, just as is observed in pleuritis. It will be seen then, that adhesions having formed between the moveable structure of the iris and the immoveable covering of the crystalline, the mobility of the former, if the adhesions are general, is entirely destroyed. If the adhesions are slight and partial, then certain portions of the pupillary margin of the iris gradually expand, as the inflammatory action subsides, whilst the adherent

portions remain fixed by their attachment to the capsule, and thus a more or less irregular form is communicated to the pupil. These adhesions may, of course, exist at any portion of the iris, and, according to their situation, the pupil will be drawn upwards, or downwards, or in any other direction, its figure being most commonly rendered oval, but sometimes so irregular as to be perfectly shapeless. An irregular form of the pupil, however, is not essential to iritis, for we often find that in the most severe cases, the whole of the iris becomes uniformly adherent to the capsule, and then the pupil retains its rotundity.

*Deposit of opaque matter* on the capsule of the crystalline always occurs when there is adhesion between it and the iris. If the inflammatory action continue and extend, lymph is thrown out beyond the pupillary margin, the clear transparent membrane behind the pupil becomes covered with the effused matter, and an opaque condition of the capsule, or, perhaps rather, the serous membrane covering the capsule, is the consequence. This is usually one of the most serious results of iritis, because the opacity of the capsule, when general, constitutes a complete barrier to the transmission of light into the interior of the eye, and it is a much more frequent cause of impaired vision than an actual closure of the pupil.

*Change of the colour of the iris* is a frequent accompaniment of inflammation of its texture. This results from deposit of albuminous matter on the anterior surface of the iris. The anterior surface, as I have said, is probably a continuation of the membrane of the aqueous humour, and, in the normal state, is perfectly transparent, so as to permit the colouring matter of the iris to be visible through it. It is obvious, then, that if this transparency be impaired by an opaque deposit, the colour of the iris will assume an altered appearance. Accordingly, the light-coloured iris, when seen through this partially opaque or turbid membrane, appears of a greenish tint, whilst the dark coloured iris becomes of a reddish colour. More rarely, it happens that the discoloration is caused by a deposition into the proper texture of the iris.

*Pustules, or tubercles*, are also sometimes observable on the anterior surface of the iris. These are probably seated under the serous membrane, which is elevated by them; in some instances they are of considerable size, more commonly, however, not being larger than a pin-head. Generally the matter contained in them becomes ultimately absorbed, when the

pustular elevations disappear. It is thought by some practitioners, that the matter is occasionally discharged into the aqueous humour.

*Effusion of puriform fluid* into the anterior chamber is frequently witnessed during the progress of iritis. In some instances, this may occur from a pustule or tubercle discharging itself into the aqueous humour; but, generally, it is the result of a morbid secretion from the serous membrane lining the aqueous chambers. This secretion bears a strong resemblance to pus, being of a yellowish colour, and sinking to the most depending part of the anterior chamber. The quantity of this fluid is sometimes considerable, so much so as to fill the larger portion of the chamber, and I have seen instances where it has appeared completely full. Generally, however, the quantity is not very great, and seldom occupies more than a third, often much less, of the space usually filled with the aqueous humour. This condition is technically named *hypopyon*. As the inflammatory action subsides, the effused fluid is found to disappear, doubtless by the process of absorption.

It can scarcely ever happen that all the symptoms which I have enumerated are present in the same case. In some instances, in addition to the pink vessels on the surface of the sclerotica, there is merely an unusual degree of contraction of the pupil, and a slight haziness, or discoloration, of the iris, with or without an opaque deposit on the capsule of the lens. In others, besides the external vascularity, one or more pustular elevations will be discerned about the pupillary margin, the pupil somewhat contracted and of an irregular form, the surface of the iris muddy, and perhaps an effusion of purulent-looking fluid in the anterior chamber. These are the most common appearances which the iris presents during the acute stage of iritis.

The symptoms of iritis differ also in intensity. Sometimes the vascularity is excessive, and the various changes in the condition of the eye, which I have described, are effected with great rapidity. At other times, the vascularity is less striking, and the alterations in the structure and appearance of the iris and capsule are slowly and partially developed.

The amount of suffering which the patient experiences is likewise variable. In many cases, there is but little pain complained of, and the general health of the patient is unaffected; while in others, there is considerable circumorbital pain, and sometimes a throbbing sensation in the

organ itself, with febrile disturbance. The degree of intolerance of light, and the amount of lachrymation, are also liable to the same differences.

Although the vascularity of the eye is principally caused by the development of the pink vessels, yet in many cases, as I have before stated, there is a considerable degree of conjunctivitis present. This latter condition, however, arises out of the general excitement of the organ, and is not essential to the iritic inflammation. The cornea, likewise, but seldom participates in the inflammatory action, although we now and then meet with cases of corneitis, in which the morbid action appears to extend from the inner lining of the cornea to the surface of the iris, and to give rise to the formation of pustules, or the effusion of puriform matter into the anterior chamber.

Iritis, indeed, not unfrequently exists without any of the other textures of the eye participating in the disordered action; but still it occasionally happens that such extension is observed. This may be the case, not only with the textures situated externally, as the conjunctiva, cornea, and sclerotica, but those which are deeper-seated may also be implicated, and the disease extend to the choroid, retina, and the contents of the posterior chamber generally. This latter condition, however, I apprehend, is not usually the result of morbid action extending from the iris internally.

*Causes.*—The causes of iritis, as far as these can be traced, are not different from those which excite other forms of ophthalmia, such as exposure to cold, and the like. This disease is often excited by direct mechanical irritation, such as wounds inflicted on the eye, in which the iris has been injured. It is also a frequent result of operations upon the eye, particularly those for the solution and depression of cataract. Iritis is also particularly apt to occur as one of the sequelæ of syphilis.

*Treatment.*—The treatment of iritis should be conducted with energy and judgment. If the case is seen early, and before the adhesive process is properly established, there is good reason to hope that our efforts to arrest the diseased action will be successful. The chief agents to be employed to effect this end are blood-letting and mercury.

*Blood-Letting.*—The relative merits of these two powerful agents are by no means clearly established. Some practitioners are of opinion, that one may be safely employed to the exclusion of the other. My own opinion is, that, as a general rule, their employment in conjunction is the safest practice. Still I have no doubt that many cases are curable with either.



Thus, I have often known, in cases in which I have prescribed blood-letting to be followed by mercury, that the disease had yielded almost immediately after the abstraction of blood, and before the mercury had had time to produce any perceptible effect on the constitution. In other instances, it has frequently happened that after blood-letting had been practised several times, and the disease yet continued to progress, no sooner were the peculiar effects of the mercury visible than the morbid action at once ceased, and a rapid improvement resulted. I think blood-letting is more likely to be effective, when resorted to previously to the effusion of lymph or pus; and, on the other hand, that when effusion has taken place mercury will be found to be the most efficient remedy.

The quantity of blood to be withdrawn, and the method of obtaining it, will depend upon the peculiarities of the individual case, more particularly the strength of system of the patient, and the intensity of the local and general symptoms. If the patient be tolerably robust, the vascularity considerable, and there be much febrile excitement present, then the free abstraction of blood from a vein ought to be practised, the quantity to be regulated by the effects produced on the system, and the appearance of the eye, during the operation. Should the inflammatory action not be materially diminished on the following day, or the strength of the patient much reduced, venesection may properly be repeated. If this, however, should appear unadvisable from the condition of the patient, we may recommend the application of a number of leeches around the orbital region, or the cupping apparatus to the temple. The number of repetitions which may be requisite will depend so much on circumstances, as to render it difficult to lay down any general rule on this point. In a case of less severe character, or in which the constitution of the patient is delicate, venesection may be superseded by cupping, or the application of leeches.

*Mercury.*—The employment of mercury in iritis, is second only to blood-letting. Its administration should be commenced immediately, because it is uncertain what length of time it may be necessary to continue it, before the peculiar effects which it produces will be observed. In some persons, we know that these effects are readily produced, while in others it is exactly the reverse. In an acute case, where it is desirable to produce these effects without much loss of time, I usually find that doses of five or six grains of calomel, given every three or four hours, are most

to be depended upon. In less urgent cases, I usually prescribe two or three grains of calomel, with half a grain of opium, to be taken every four or six hours. In delicate persons, and in children of strumous constitutions, and in those individuals who are more readily affected by mercury, I generally substitute small doses of calomel, or of the hydrargyrum cum creta, for the more energetic formulæ before mentioned.

On the other hand, if a difficulty be experienced in producing the full effects of mercury, then the employment of mercurial ointment by friction should be resorted to. We are generally advised to rub it on the inside of the thighs or arms, but I think I have found it to be more successful when rubbed underneath the jaws.

The length of time which it may be necessary to continue the exhibition of mercury, must be regulated by its effects both on the system at large and on the condition of the eye in particular. It is obvious that after ptyalism, or considerable ulceration of the gums, has been produced, the remedy must either be discontinued, or its exhibition be considerably restrained. If, with these effects on the salivary system, the condition of the eye be simultaneously improved, as denoted by the diminished vascularity, the partial absorption of the effused matter, the gradually-dilating condition of the pupil, and the diminution of pain, then the mercury may be at least temporarily discontinued, its resumption to be regulated by the cessation or continuance of the morbid action which led to its original use.

*Belladonna.*—The next remedy of importance, after blood-letting and mercury, is the local use of belladonna. We can scarcely begin the employment of this remedy at too early a period of the treatment, because if adhesions are not already formed, the dilatation of the pupil will be easily accomplished; and if the adhesive process is established, then, so soon as the adhesions begin to yield, the belladonna will produce its peculiar effect on the iris. It evidently will, therefore, be most important to have recourse to it in the very earliest stage of iritis, if possible before adhesions are formed; because, otherwise, it will not produce the proper effect until the morbid action is subsiding, and therefore when it is less needed.

The two most important results we have to fear, in a case of iritis, as I have before intimated, are a fixed contraction of the pupil, and

a deposit of lymph on the capsule of the lens. In some cases of iritis, the pupil becomes actually obliterated, by which I mean the fibres forming the pupillary margin of the iris are approximated, or at least agglutinated together by the intervention of coagulable lymph, which is poured out from the surfaces of the iris, during the state of extreme contraction of the pupil. More commonly, however, vision is impaired, from the deposition of lymph on the clear, transparent texture immediately behind the pupil. Sometimes this deposit becomes speedily organized, and remains permanently adherent to the capsule; on other occasions, it becomes absorbed, and the transparency of the capsule is restored. It may be that the deposition of lymph results from the extension of the inflammatory action to the capsule, but it is more commonly supposed to be secreted from the surface of the iris itself. If this latter opinion be correct, we perceive the importance of procuring a dilatation of the pupil, so as to remove the iris to a distance from the centre, and towards the circumference of the capsule. The use of belladonna, then, so as to maintain an artificial dilatation of the pupil, is a matter of importance in the treatment of iritis.

*Theory of the Action of Belladonna.*—An explanation of the peculiar effect of belladonna on the iris involves the question of the mobility of that texture. Now, although there is a difference of opinion as to the cause of the mobility of the iris, yet the view generally entertained is decidedly in favour of muscularity. The motions of the iris, then, I venture to state, are accomplished by two sets of fibres, a set of circular fibres surrounding the margin of the pupil, and a set of radiated fibres proceeding from the former towards the ciliary or outer margin of the iris. The actions of these opposing muscular fibres are regulated by branches from the third and fifth pairs of nerves, through the ophthalmic ganglion; the former exciting the radiated, the latter the circular fibres. Other branches of the fifth are also freely distributed to the iris, palpebræ, and eye-brows; these latter are the medium of communicating the narcotic effect of the belladonna to the circular fibres of the iris, which, by its influence, become paralysed, and thus the radiating fibres, having no antagonist, cause an expansion of the pupil, by drawing the substance of the iris towards the ciliary margin. This appears to me the most rational explanation that can be given of the action of narcotic substances upon the iris. I cannot here give more than this general statement of my views on this subject, and for

further information must refer the reader to my treatise on "The Philosophy of the Eye."

The ordinary mode of employing belladonna is, by freely rubbing the moistened extract on the outer surface of the palpebræ, and on the skin of the eye-brows; and a portion should also be spread on a piece of soft linen, and laid over the whole orbital region. It should be kept constantly applied, and often renewed, particularly in the evening, because, during sleep, there is the greatest tendency to contraction of the pupil. Some practitioners introduce a few drops of a solution of the extract upon the conjunctival surface; but this is not so proper in the acute stage of the disease, since it increases irritation, and is, probably, not more efficacious than when applied to the cutaneous surface.

Belladonna is the substance most to be depended upon for producing dilatation of the pupil, but there are two or three other vegetable productions which have a similar effect, such as, *hyoscyamus*, *stramonium*, and *lauro-cerasus*. These substances have been long known to produce this peculiar effect on the iris, but the subject was first brought before the profession in a methodical manner by Professor Himly, in 1801.

The active principle of belladonna, *atropine*, has lately been introduced into practice; and Dr. Jacob, of Dublin, has employed a modification of it, *sulfate of atropia*, in the proportion of two grains to an ounce of water, which he considers may be advantageously substituted for the extract of belladonna. The price of these preparations is, however, so extravagant, (one hundred shillings per ounce,) as to prohibit their general use, even if it should really be found that they possess any great advantage over the extract, which is very doubtful.

Blood-letting, mercury, and belladonna, then, are the remedies on which we must chiefly rely for the successful treatment of iritis. Other remedies, however, are sometimes had recourse to.

*Exhibition of Turpentine.*—Within the last few years, spirit of turpentine has been successfully employed, particularly in cases in which mercury is considered objectionable. Mr. Hugh Carmichael was the first to suggest this remedy, which he prescribed in drachm doses, given with almond emulsion; and it appears that the disease has been frequently cured, and with as much facility, by it as after the use of mercury. If mercury be sometimes an objectionable remedy, turpentine would seem to be at all times a disagreeable one; and, as mercury seems to be more certain in its

effects, it is hardly likely to be superseded by turpentine: the latter medicine seems to operate by producing a considerable amount of irritation in the urinary organs; in fact, its action is that of a counter-irritant. It is doubtful if mercury acts in a different manner, its superior value being probably owing to the more powerful and lasting effect produced on the salivary system, and through it on the system at large.

*Opiates.*—If, during the progress of the disease, the patient should experience much pain in the organ or neighbouring textures, which, when it occurs, is usually of a neuralgic character, the employment of opium, both internally and by friction, in the manner before explained when speaking of the treatment of sclerotitis, will be advisable. Indeed, opium may be administered in combination with the mercury which is exhibited, except there should be some particular reason to the contrary.

*General Remedies.*—Purgatives, diaphoretics, and other remedies, will, under certain circumstances, be necessary; these I need not dwell upon, as they are sufficiently obvious.

*Local Remedies.*—Local applications are of little or no use in the acute stage of iritis, except, indeed, such as are of a sedative character, as the extract of belladonna, mercurial ointment with opium, and the like.

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## SECTION II.

### CHRONIC IRITIS.

The observations already offered are more particularly applicable to the acute form of iritis. If the disease have existed for some considerable time before we see the patient, or if it be of a less active character, the symptoms may be somewhat modified; the vascularity, although possessing the peculiarities before pointed out, may be of trifling extent, the irritation less severe, the patient complaining of little but imperfection of vision. In this state the pupil will be more or less contracted, motionless, and of irregular form; an opaque deposit will probably occupy a considerable part of the capsule immediately behind the pupil; or, if the disease be in a still more advanced stage, we may find the iris has a puckered and very irregular appearance, some portions of its surface bulging forwards, and

others drawn backwards. This last condition probably depends upon extensive adhesions to the capsule of the lens, more or less complete at various points (*synecchia posterior*), and is not often witnessed except in conjunction with a morbid condition of the deeper-seated textures, particularly the choroid. In many of these cases, the aqueous humour being no longer secreted in sufficient quantity, the iris is gradually pushed forwards and with it, probably, the opaque capsule and lens, until it comes in contact with the inner surface of the cornea, when the anterior chamber is obliterated, constituting the condition termed *synecchia anterior*. In this event, however, I do not imagine that the iris becomes adherent to the cornea, as some suppose, except there has been actual inflammation of the latter texture, the adhesive process having terminated long before this stage of the disease arrives.

In other instances, in addition to contracted pupil and opaque capsule, I have occasionally noticed a decided vascularity of the iris itself, vessels being clearly traceable from the sclerotica on to the iris, forming a plexus over its entire surface, and that of the opaque capsule. In some rare cases, too, I have witnessed effusion of blood into the anterior chamber; this has generally occurred in cases in which the disease has been protracted, and liable to frequent exacerbations.

*Treatment.*—In chronic iritis, then, the vascularity being inconsiderable, and the morbid process of a slow and inactive character, the treatment need not be of that energetic character, as to call for much blood-letting. In some instances, it may be necessary to cup the temple, or to apply a few leeches around the eye. If there be scarcely any vascularity, and we have but the effects of the morbid action to contend with, then blood-letting will not be of any service, and we must trust more particularly to the internal exhibition of mercury, the local application of belladonna, and the use of counter-irritants.

Mercury should be given in smaller quantities, and not so frequently repeated as in the acute form of iritis, as the object of the practitioner should be, not to create a violent, but a more continuous effect on the system. With this view from five to ten grains of the mercurial pill may be given night and morning to an adult, or two or three grains of calomel, made into a pill, with half a grain of opium; and to children, one or two grains of calomel, or the hydrargyrum cum creta, at the like intervals. This treatment it is usually necessary to continue for some time before any

perceptible change in the condition of the eye is produced, or before the system evinces any decided effect from its employment.

The extract of belladonna should be applied every night to the eyebrows and lids, and a small portion should also be introduced within the margin of the lower lid, so as to come in contact with the conjunctival surface; or a strong solution of the extract may be applied to the conjunctiva, by means of a camel-hair brush, once or twice a-day. I am not sure that belladonna has any very powerful influence in separating adhesions when once formed; but its application may be useful in causing a dilatation of the non-adherent portions of the pupillary margin, and may thus be serviceable in preventing new adhesions forming. Indeed, its employment may tend to throw considerable light on cases which appear obscure and uncertain; since, if the pupil dilate irregularly, it is a clear proof that there are partial adhesions to the capsule, and that inflammation and effusion have existed; and, if the adherent surfaces are separated under its use, it will be likewise a proof of the subsidence of the morbid action, and will assist in determining the propriety of continuing, or otherwise, the remedies best adapted for its subduction.

Counter-irritation, I am inclined to recommend in the advanced stage of iritis; it may be produced by the occasional application of blisters, or tartar emetic ointment, to the temple, or a permanent drain may be established by means of a seton or issue, according to circumstances.

In the more protracted cases of iritis, particularly such as are accompanied by an enlarged and varicose condition of the vessels, I have found very beneficial results from the application of stimulants to the conjunctival surface of the lids. These can only properly be resorted to after the acute stage has passed away. I have ascertained, by careful experiments, that their use in acute internal ophthalmia is not to be commended. In one case of iritis, which, although it had existed for several weeks, was attended with considerable vascular excitement, I applied the nitrate of silver in the usual manner, and found that its use was followed by an effusion of puriform fluid into the anterior chamber; the effused fluid, however, gradually became absorbed, and, although its employment in this case was not prejudicial, since the eye ultimately recovered completely, yet I could not observe any indication for its future use. In a more advanced stage, however, I am quite satisfied that it will often prove a valuable agent.

## SECTION III.

## SYPHILITIC IRITIS.

I have already stated that syphilitic disease often extends to the iris, and gives rise to acute inflammation of its texture. This is a very frequent occurrence, so much so that when we find iritis among a certain class of individuals, we immediately inquire if there are any other symptoms of syphilis, either primary or secondary. Iritis is most commonly met with among the secondary or constitutional symptoms of lues, such as ulceration of the throat and eruptive disease of the skin. It is well that we should be conversant with this fact, so as to be aware of the frequent combination of syphilis with iritis; but I do not know that it will lead to any practical results, since the treatment of iritis, however excited, must always be conducted on the principles I have laid down. Nor are there any diagnostic symptoms which could enable a practitioner to say, by merely examining an eye thus affected, that such a case is syphilitic or otherwise. It was formerly thought that the existence of tubercles and the displacement of the pupil upwards, were decisive of the syphilitic origin of the disease. Such a notion, however, is now completely exploded.

The student will find in several of our modern works very elaborate articles on the subject of *syphilitic*, *rheumatic*, *arthritic*, and *strumous* iritis. The conditions of the system indicated by these different epithets render the eye, unquestionably, more disposed to be affected by disease than is the case in healthy constitutions; but that such conditions materially or perceptibly modify the character of ophthalmia generally, or of iritis in particular, is, to my mind, certainly not established. Moreover, the treatment admits of no further modification, so far as the eye is concerned, than that I have already pointed out, and which relates more to the intensity and duration of the disease than to the exciting cause.

In whatever kind of constitution iritis occurs, it will require blood-letting and mercury, if the activity be considerable; but, in a person of delicate or strumous constitution, these remedies should be sparingly employed, and their use speedily followed by the exhibition of quinine and other tonics. If iritis occur in a person of a rheumatic or gouty diathesis, then colchicum and other suitable remedies may be employed in conjunction with those I have before advised.



I have before given the details of an instructive case of idiopathic iritis, in the acute form, in another portion of the work (p. 11), and to it I again refer the student. I subjoin the following cases, which will serve to illustrate the nature and treatment of the other principal forms of iritis.

CASE I.—Thomas C., aged 29, was admitted an out-patient of the hospital November 12, 1845. He had been ill and under the care of a medical man for a week; complained of great pain in the supra-orbital region and globe of the left eye, with intolerance of light and much lachrymation, vision being much obscured. On examination, the pupil was seen to be contracted, rather irregular, and not normally dilatable. Pink zone was perceptible, but in some degree masked by the great vascularity of the conjunctiva. A deposit in the form of tubercles was also observed in the centre of the left half of the iris. He had several times been the subject of syphilis, and had at the time of admission a copper-coloured eruption extending over a large surface, and some soreness from ulceration of the throat.

He was ordered to have eight leeches applied around the eye; afterwards to have the extract of belladonna; and to take two pills, containing two grains of calomel with half a grain of opium, three times a day, with the compound senna draught every other morning.

15th. Had passed two better nights; there was less pain in the eye, but he could not bear exposure to the light; the other eye appeared to be sympathetically affected, and he felt easier when both eyes were covered. The vascularity of the conjunctiva and sclerotica, and the internal appearance of the eye were much the same. The gums were slightly affected. Six leeches to be applied to the eye; two pills to be taken night and morning; and the belladonna to be continued.

19th. Felt considerably better. The last bleeding gave him decided relief. Complained of the soreness of his gums, which were freely mercurialized. Could bear the eye to be exposed, and continued to sleep better. The pink zone very distinct, owing to the subsidence of the conjunctival vascularity: from the same circumstance, the white or arthritic circle was very distinct; the tubercles on the iris much diminished. Omit the pills, but continue the belladonna.

22nd. Improving; complained much of the ptyalism; vascularity of the superficial vessels gone, whilst that of the sclerotica was only slightly perceptible. To continue the belladonna around the eye, and to have the following for the mouth.

.℞. Solut. calcis chlorid. ℥ss. Aquæ ℥viiis. Misce, fiat Gargarisma frequenter utend.

December 6th. The patient had continued to improve. The pupil acted normally; the deposit on the iris was almost absorbed; all appearance of inflammation of the eye, together with the eruption and sore throat, had disappeared; and vision was very good. He was advised to continue the application of belladonna around the eye for a short time longer, and to expose the organ gradually to the influence of light.

**CASE 2.**—Margaret S., aged 40, had been the subject of a severe attack of acute rheumatism before applying to the hospital for the disease of her eyes.

October 29th, 1845. She had just recovered from an attack of iritis of the right eye, and now complained of the left, which presented a congested state of the superficial vessels together with the pink zone and distended straight vessels of the sclerotica; there was deep-seated pain in the supra-orbital region, aggravated at night; the pupil contracted and rather irregular; vision obscure, but not much intolerance of light or lachrymation. A blister was ordered to be applied to the left temple, and to be kept discharging with the cantharides ointment; the bowels to be kept open by the ordinary purgative pill; and the belladonna to be applied around the eye.

November 1st. The eye was not much easier and the pain about the superciliary ridge was very distressing; the pupil much contracted and the vascularity undiminished. Eight leeches to be applied to the eye, and to take the calomel and opium pills three times a day.

5th. There was less vascularity, but the irritation still very considerable; the gums very sore. Ordered to discontinue the pills, and to take instead 20 minims of the tincture of colchicum three times a day.

9th. Stated that she felt great relief the day after she was last at the hospital, after taking the colchicum; had passed three good nights; pain and all appearance of inflammation gone, and vision greatly improved. The patient presented herself two or three times after this date, the eye continued to improve, and she was shortly dismissed, cured.

## SECTION IV.

### IRITIS IN INFANTS.

Iritis, when observed in infancy, is most probably, in the majority of instances, owing to a syphilitic taint, propagated either before birth, or during the period of suckling, from the mother to the child. But it is not to be assumed that all cases are necessarily of syphilitic origin, since there is no reason why iritis should not occur independently of such a cause as well in infants as in adults.

I conceive it important that the notice of the profession should be directed to this variety of infantile ophthalmia, more especially as in two of the cases which have come under my observation, the disease was mistaken for one of a still more serious description; a mistake which had

been made, no doubt, because it was not supposed that young children were subject to the affection in question.

Most recent writers on ophthalmology have been particular in describing the various diseases of the eye, which are observed in infancy. The one in question, however, appears to have been nearly, if not altogether, overlooked. It certainly is not a very common affection, but occurs sufficiently often to demand the attention of practitioners. I have myself witnessed not less than half a dozen cases in as many years.

The symptoms of the disease in question are very different from those of the ordinary ophthalmia of infants. The conjunctiva is but slightly affected, so that there is rarely any mucous or purulent secretion observed. The sclerotic coat is generally inflamed, and hence the deep-seated and pink-coloured vessels are often numerous, and there is usually considerable intolerance of light and lacrymation. But it is principally in the iris and capsule of the lens that the more striking and characteristic symptoms are noticed: thus the colour of the iris is usually changed, its brilliancy is materially impaired, and its movements are sluggish, if not actually suspended, the pupil being usually much contracted and sometimes of a very irregular shape. The morbid action rapidly extends to the capsule of the lens, as indicated first by a muddiness in the pupil, and subsequently by a deposit of lymph, which soon becomes organized and permanently adherent to the capsule.

The danger to vision will of course depend upon the amount of opacity of the capsule, or of the contraction of the pupil. If either of these conditions is extensive and likely to be permanent, then an unfavourable, or at least a guarded prognosis should be given.

In the treatment of this variety of infantile ophthalmia, we must rely chiefly on internal remedies, and such as affect the system at large. In most cases it will be useful to apply leeches to the palpebræ in such numbers as are suitable to the age and constitution of the child. Purgatives, and in some cases even nauseants, should be freely administered in the first instance; but these must not be allowed to supersede the employment of mercury. Small doses of calomel, or of the hydrargyrum cum creta, should be administered without delay, and continued until the progress of the disease has been arrested, or the system has been brought under the influence of this powerful agent. The extract of belladonna should also be applied freely around the orbital region, so as, if possible, to keep the

pupil in a state of expansion. In some instances, an evaporating lotion may be usefully prescribed in the more acute stage of the disease, but the belladonna must be regarded as the paramount local remedy.

**CASE 1.**—Mrs. D's infant, aged 7 months, residing in a suburb of Manchester, was brought to me on the 19th of December, 1838. About fourteen days previously, her mother observed some alteration in the appearance of the right eye, which excited her apprehension. The child was taken to the usual medical attendant of the family, who gave it as his opinion that it was a case of incipient fungus, an opinion which aided materially to increase the apprehension of the parents. On examination the following appearances were noticed: The iris, which was of a dark blue, appeared to have undergone a slight change of colour, looking somewhat duller than that of the sound eye; the pupil was much contracted and fixed, and there was a small streak of lymph deposited upon the capsule of the lens; there was no other mark of disease, not the least vascularity of any of the other tunics. When the sound eye was obscured by a bandage, she seemed to take no notice of any object, so that it was evident that vision was much impaired, if not actually destroyed in this eye. In other respects the child was healthy, and did not seem to suffer from the ocular affection. She was directed to take two grains of calomel night and morning, and to have a solution of extract of belladonna applied freely to the eye.

December 22nd. No change. To apply the extract of belladonna around the orbital region every night, in addition to the other remedies.

28th. The pupil was somewhat more dilated; almost the whole of the capsule exposed to view was decidedly opaque, a small portion in the centre alone retaining its transparency. To continue the remedies.

January 22nd, 1839. But little change was observed since last report; the opacity had extended entirely over the capsule, as far at least as it was visible, the pupil being more contracted and fixed, and the iris appeared to project towards the cornea, so as to diminish the size of the anterior chamber. To continue the extract of belladonna, and the calomel powder every other night.]

March 21st. No alteration had occurred until within the last three or four days, since when there had been considerable inflammation of the external tunics, and an increase in the deposit of lymph, which was now continued on to the anterior surface of the iris, the pupil being still fixed and contracted. Ordered three leeches to be applied to the palpebræ; an evaporating lotion afterwards castor oil occasionally, and the calomel powders night and morning.

26th. The vascularity of the external tunics had disappeared, and the lymph that had been deposited on the anterior surface of the iris was absorbed. No other change. No alteration in the condition of the eye was observed after this time, the pupil remaining permanently contracted and the capsule opaque.

**CASE 2.**—Mary C., aged six months, from Warrington, was admitted a patient of the hospital, September 21st, 1844. The mother stated that the right eye had

been inflamed about three weeks, as evinced by redness, lacrymation, and swelling of the palpebræ. Within the past week an opacity was perceived in the centre of the pupil, which alarmed the parents and caused the medical man who saw her to express a very unfavourable opinion as to the result.

When admitted, the vessels of both conjunctiva and sclerotica were numerous and much injected; the cornea was somewhat hazy; the iris muddy, with three or four small whitish tubercles deposited on its surface; the capsule partially opaque; the pupil circular, not much contracted, but motionless. On the forehead, were six or seven copper-coloured spots, about the size of a silver three-penny piece, which were first noticed a few days before the eye became affected. When six weeks old, the hands and feet were almost covered with similar blotches, and there were some about the anus, for which medicine was administered and the eruption disappeared.

She was ordered two leeches to the palpebræ, an evaporating lotion to be applied after the bleeding, the extract of belladonna to be smeared over the orbital region nightly, and to take internally two grains of hydrargyrum cum creta night and morning.

24th. The inflammation had much abated; the cornea looked brighter, but there was no material change in the appearance of the iris or capsule of the lens; the pupil, however, was somewhat more dilated. The general health was somewhat impaired, and the stomach and bowels especially, considerably deranged. To continue the medicines before prescribed.

October 9th. The inflammatory action had entirely ceased; the pupil moderately dilated and apparently fixed; the iris appeared dull, but the tubercles had disappeared from its surface; several irregular streaks of organized lymph were still observed on the capsule, and will probably be permanent. The blotches on the forehead were much diminished, the bowels more regular, and the general health better. To continue the belladonna and mercurial powders. Soon after this the child was taken home, and no account has been received of it since.

CASE 3.—In another case, of which I omitted to take notes, one eye was attacked with purulent ophthalmia at the period of birth, or immediately afterwards, from which it completely recovered under the treatment I usually adopt, viz., the stimulant. The other eye was attacked with iritis when the child had reached the age of five months, from which it also recovered, under the treatment by mercurials, belladonna, &c., leaving the pupil, however, contracted and irregular, but without any opacity of the capsule. In this instance, it was admitted that the parents had been affected with some form of venereal disease.

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## SECTION V.

## CLOSED PUPIL.

When we have had an opportunity of observing a case of iritis in its early stage, and have promptly resorted to the means of treatment before described, it usually happens that the disordered action is subdued, and that vision is completely restored. If, on the other hand, we have not had the case under treatment until extensive adhesions have formed between the iris and capsule of the lens, or until the latter has become covered by opaque deposit, we shall frequently find that all our treatment will be of no avail, and that the patient's sight is materially impaired.

The impairment, or loss of vision, which results from an attack of iritis, I have before stated to be referable to two sources: first, an extreme contraction, or closure of the pupil; and secondly, an opacity of the capsule of the crystalline humour. Now, as I have just said, it frequently happens that, notwithstanding the steady and persevering employment of mercury, belladonna, and other remedies, these morbid conditions of the eye are permanent and irremediable, so far as therapeutical agents are concerned. In this event, operative proceedings are required, and are frequently productive of the most beneficial result.

## OPERATION FOR ARTIFICIAL PUPIL.

Before we shall be justified in resorting to an operation for artificial pupil, we must be perfectly satisfied that all the means before advised have been properly employed, and that every trace of vascularity has disappeared,—that the eye, in short, has completely recovered from the effects of the morbid action, with the exception of the contracted state of the pupil and the opacity of the capsule.

We shall also have to consider the amount of vision which actually remains to the patient, because it is obvious that if the sight be only impaired, if vision exist to such an extent that he is enabled to find his way about comfortably, or to read large type with optical assistance, it will scarcely be worth while to perform an operation, which it is possible (from the accidents which sometimes result from the best managed operative proceedings) might not only be of no service, but leave him even worse than before. If, on the other hand, the patient's vision

should be so much damaged, the disease having affected both eyes, or, in the event of one eye only having suffered, the sight of the other having been seriously injured in some other way, that he is unable to move about without a guide, then we shall be warranted in attempting some operative means for his improvement, since, with the failure of the attempt, his condition can scarcely be made worse.

But the state of the eye may be such as to render all operative proceedings perfectly hopeless. This, of course, can never happen in a case of closed pupil, simply from iritis. In some cases of iritis, however, the inflammatory action extends, as I have before pointed out, to the deeper-seated textures, and involves not only the choroid, but also the retina and the humours; and, in others, it happens that the external tunics have been implicated, and that the cornea has been rendered extensively opaque. Either of these complications materially lessens the chances of success, and must be duly considered before deciding upon an operation.

With respect to the first of these conditions,—the extension of morbid action to the internal textures, especially the retina,—it is often difficult to arrive at a satisfactory conclusion, because, in cases where the pupil is obliterated, and the capsule exceedingly opaque, an impenetrable barrier is offered to the passage of light into the interior of the eye, and we are consequently unable to form an accurate judgment as to the sensibility of the nervous membrane. In this condition we must deduce our prognosis from the general appearance of the eye; and, if we should find evidence of the existence of internal disease, such as a varicose condition of the vessels on the surface of the globe, attenuation of the sclerotica, an unnatural degree of firmness, or a soft, doughy feel on pressing the eye-ball, or a marked increase or diminution of the general bulk of the organ, then the presence of all, or any, of these symptoms, should deter us from performing an operation, as the existence of so much disorganization of the internal textures would be indicated, as to render it certain that the function of the retina would be materially impaired, if not annihilated. Again, if we should find the anterior chamber obliterated, the iris being in contact with the cornea, and more especially if the structure of the iris have been much changed, as denoted by its puckered and irregular appearance, this state would also imply the existence of so much mischief in the interior of the organ as to render the prognosis extremely doubtful.

If an opaque condition of the cornea accompany closed pupil (and the

remark will equally apply to a case in which the pupil is merely obscured by the opacity of the cornea), we should have to consider if a sufficient portion of that texture retain its transparency, to allow of the transmission of light through an aperture to be formed in the iris beneath. The extent of surface which becomes opaque, and the density of the opacity, are exceedingly variable; and we sometimes find that persons are able to see when there is very considerable opacity, and that others have very little vision when the opacity is slight; so that we may be much deceived in our conjectures on this head, and hence the necessity for caution. When a moderate portion of the cornea remains perfectly transparent, or when the entire cornea is opaque, we have less difficulty in forming a prognosis; the doubtful cases being where there is a general opacity, with only a partial and imperfect transparency at one or more points, and these of inconsiderable extent.

These are the considerations, then, which are to guide us in forming an opinion as to whether a particular case is suited for the operation of artificial pupil, or otherwise; and, if the diseased action appear to have been confined, or nearly so, to the structure of the iris and capsule of the lens, we need not hesitate as to the propriety of an operation.

Now, there are several methods of proceeding by operation. These must, each of them, have reference chiefly to two points,—first the making a sufficient aperture in the iris; and, secondly, the removal of the opaque capsule. Both of these ends may be attained by different means.

An aperture may be effected in the iris in several modes; first, by excising a portion of its substance; secondly, by making an incision into it; and thirdly, by separating it from its attachment to the ciliary ligament.

#### CORECTOMIA, OR EXCISION OF A PORTION OF THE IRIS.

The operation by excision, or as it is technically named, *corectomia*, being the one most frequently successful, and in all respects the best, I shall give an account of it first.

In order to effect the removal of a portion of the iris, it will be necessary, in the first place, to make an opening through the cornea into the anterior chamber; and *the incision should always be made close to the ciliary margin*, so as to facilitate the egress of the portion of iris to be excised. For want of attention to this important point, I have sometimes



seen the surgeon much perplexed and his intentions completely baffled. The extent of the incision into the cornea need not, in a case where we intend simply to remove a portion of iris, be very considerable, not beyond one-sixth of its entire circumference. If a puncture be made with the cornea-knife, so as to allow the point of it to reach the centre of the iris, the aperture thus made in the margin of the cornea will be sufficiently large to allow of the introduction of a sharp hook, which, after the withdrawal of the knife, should be passed into the wound of the cornea, as far as the site of the original pupil, and a portion of the iris, by this means, drawn out through the aperture. The portion of iris to be extracted need not be very large: a small piece, about the size of a pin-head, is usually sufficient to form a pupil of considerable size. It is important that the hook should be carried quite to the centre of the iris (and to effect this easily it should be introduced with its bend sidewise), and that the portion of that membrane to be removed should be from the same point, so that the aperture may be as nearly central as possible. The portion of iris in which the hook is entangled, being drawn out through the opening in the cornea, is to be laid hold of with a fine pair of forceps, and then cut off with scissors. Sometimes the forceps is introduced through the wound of the cornea, for the purpose of withdrawing the necessary portion of iris, but the hook is usually a preferable instrument, care being taken not to touch the capsule, when it is transparent.

The proceeding thus far described, it will be perceived, will only remedy those cases in which there is no opacity of the capsule, or lens, or in which those structures are absent, as in closed pupil, after the removal of cataract. If an opaque capsule, or lens, remain behind the iris, the proceeding hitherto described will be of but little avail, at least it will only be preliminary; it discloses to us the fact, that there is still an opaque body in the axis of vision, and that further proceedings for its removal are requisite. We have now a less complicated case to deal with, it being converted simply into a case of opacity of the capsule, or lens, or perhaps of both; and we may afterwards proceed to the treatment of the latter condition. In practice, it makes no difference, as I shall hereafter more particularly explain, whether the capsule alone be opaque, or whether the lens be also implicated, since we cannot remove the former without the previous removal of the latter.

There are several modes in which the lens and capsule may be removed-

If the wound of the cornea, which has been made for the removal of a portion of the iris, is sufficiently large for the lens to pass through, the capsule being first lacerated, it may, by gentle pressure on the eye, be forced through the aperture in the iris and out of the wound of the cornea; or the curette may be introduced through the newly-formed pupil, and the lens withdrawn by its agency. If only a puncture of the cornea have been made, with a view simply to draw out a portion of the iris, then the opening will not usually be sufficiently large for the removal of the lens, and it may be either broken up with the curette, and left to undergo absorption; or we may wait until the eye has recovered from the effects of the first operation, and then extract the lens. In the case of young persons, however, the lens being generally small, it may often be dialoged at once, either with the curette or the sharp hook.

In cases of the description we are now more particularly considering, viz. closed pupil with opaque capsule, the late Mr. Gibson advised that the capsule and lens should be first broken up, and that an artificial pupil should afterwards be made, when the irritation occasioned by the first operation had subsided. "The second part of the operation 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 opening, whose length was about one-third the diameter of the iris, as nearly as could be calculated. The cornea-knife was then gently withdrawn, and the iris-scissors 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."

Baron Wenzel used to perform the same operation as that for extraction of cataract, and whilst passing the knife through the anterior chamber he dipped it into the iris just before reaching the centre; then, depressing the handle, he brought the point of the instrument out nearer to its nasal

margin, so as to make a semicircular flap. The incision of the cornea being completed, he then introduced a pair of scissors, and snipped off the flap which had been made in the centre of the iris, and through the aperture thus formed the lens was extracted.

These, then, are the different methods which may be pursued when we wish to make an artificial pupil by excision.

#### COROTOMIA, OR DIVISION OF THE IRIS.

There are other modes of effecting an aperture in the iris, without the removal of a portion of its substance; and the one to which I shall next allude is that by incision, or *corotomia*.

The first operation of this description, and indeed the first that was ever performed for artificial pupil, was that introduced by Cheselden, at the commencement of the last century. It consisted in passing a sharp needle, with a cutting edge, through the sclerotica, which was made to perforate the iris near its outer margin; it was then carried across the anterior chamber to near the inner margin, and whilst withdrawing the instrument, an incision was made through the centre of the iris, in such a manner as to effect an aperture in it. This operation, when successful, forms a pupil in a transverse direction, and of an elliptical figure. It was resorted to by Cheselden, in cases of contracted pupil, after the depression of cataract; and, as he states, with good success.

The success which Cheselden himself met with, seems not to have resulted from the employment of his operation by others, and it was accordingly for some time abandoned. It was revived by Sir William Adams in 1812, who devised an instrument better adapted than Cheselden's for its performance, which is named the iris-scalpel. This instrument, in fact, is a very small scalpel, and is introduced into the eye, and used precisely in the manner I have stated to be the method of Cheselden.

Cheselden's operation is chiefly resorted to in cases of closed pupil after the removal of cataract. In cases where the opaque capsule and lens are still remaining, Sir William Adams recommended that they should at the same time be freely divided with the iris-scalpel, the lens broken up into fragments, and protruded partly into the anterior chamber, and the remainder be left in the newly-formed pupil, so as to prevent the reunion of the divided surfaces.

The principal objection to the performance of this operation is, that there is often considerable difficulty in effecting the incision; for it is usual in practice that very frequently the iris, instead of allowing the instrument to pass through it when cutting out, (so slight is its attachment to the ciliary ligament,) is torn away and separated from it; and we may be certain that such an occurrence, which is often witnessed, must not only baffle the intention of the operator, but also be productive of serious mischief to the internal textures of the organ. Again, if the structure of the iris have been much diseased, this condition, as Dr. Mackenzie observes, is one which renders this operation objectionable, inasmuch as the aperture, if properly made, would be almost certain to become speedily reclosed. This is not so likely to happen if the iris retain a healthy appearance, and more particularly if its fibres are on the stretch, when a portion of them are adherent to an opaque part of the cornea, when the pupil is drawn to the ciliary margin, as in cases of prolapsus of a portion of the iris, after ulceration of the cornea, or after the operation of extraction.

A better mode of dividing the iris with this instrument has been recently recommended by Mr. Estlin, of Bristol. It has been practised many years by Mr. Alexander. It consists of passing the iris-scalpel *rough the margin of the cornea and dividing the structure of the iris with the instrument in the anterior chamber.* This operation is decidedly preferable to that in which the instrument is introduced behind the iris, I can state from personal experience, having myself tried it successfully in a case of closed pupil after injury.

Janin, finding that he did not succeed very well with Cheselden's operation, and noticing, moreover, that a wound made in the iris accidentally with a pair of scissors did not properly close, devised the method of opening the cornea to about one fourth of its circumference, and of then making an aperture in the centre of the iris with a fine pair of scissors. This method of forming an artificial pupil was found to be more frequently successful than Cheselden's.

Maunoir, however, discovered that even the proceeding of Janin was not so successful as could be desired. The alteration suggested by him consisted in making two incisions with the iris-scissors (a quarter section of the cornea having been previously made), proceeding from near the outer margin towards the centre of the iris, in the shape of the letter V,

the apex being in the centre, the base near the ciliary margin; after which he found that "the apex of the triangular space retracted towards its base, leaving in the middle of the iris an artificial pupil of the figure of a parallelogram, or of a crescent, with the cornua directed to the great margin of the iris, when the apex of the divided portion has not completely shrunk towards its base." In cases in which the capsule and lens were opaque, Maunoir extended the incision of the cornea to one-half of its circumference, and removed the lens through the newly-formed pupil.

CORODIALYSIS, OR SEPARATION OF THE IRIS FROM THE CILIARY MARGIN.

Cases had been observed by Schmidt and Scarpa, in which a portion of the iris had been accidentally torn from the ciliary ligament, so as to leave an opening through which the patients had very accurate vision. Hence, it occurred to them designedly to produce the same result in cases in which the pupil was either closed or obscured by opacity. As this mode of operating was speedily abandoned by its promoters, the aperture being found to become soon closed again, I need but observe that it is only applicable in cases of general opacity of the cornea, where there is a small transparent portion remaining at the ciliary margin, and that when it is resorted to, a curved cataract needle should be introduced from the opposite side of the eye, through the sclerotica, and passed between the margin of the iris and the ciliary ligament, immediately beneath the transparent portion of the cornea, the iris being drawn towards the side at which the needle was introduced, so as to form an aperture.

IRIDENCELEISIS.

The artificial pupil formed by separating the iris from the ciliary ligament, being found, as I have said, to become speedily closed, subsequent operators have proposed, in cases where there is only a small transparent margin of cornea, to make an incision through the opaque structure, with a view to the introduction of a hook for the purpose of withdrawing the separated portion of the iris, and either to cut off the same,—thus combining separation with excision,—or leave it in the aperture of the cornea, so that it may be strangulated, and ultimately become adherent thereto, constituting what has been termed *iridencleisis*. Supposing the transparent portion to be on the nasal side, a puncture is made with a corne-

knife, at a point about midway between the temporal margin and the healthy portion of the cornea. The opening must not be larger than is needed for the introduction of the hook, more especially if the portion of iris is to be left for the purpose of being strangulated between the edges of the wound, because if it be of a considerable size, then it is quite clear that the portion of iris withdrawn will be likely to recede within the eye after the removal of the hook.

Some rather complex instruments have been devised for the performance of this last operation. A double hook was invented by Reisinger, which is so contrived as to act both as hook and forceps. This is introduced into the eye as a single hook, when it separates into two by its own elasticity : having embraced the ciliary margin of the iris at two points, its two sides are made to approximate, when it also acts additionally as forceps, and it is then withdrawn, bringing with it a portion of the iris. Several kinds of *iris-hook*, or *corección*, as it has been termed, have subsequently been invented by Langenbeck, Gräfe, and Schlagintweit, still more complicated than that of Reisinger. It is extremely doubtful if these complicated contrivances are at all superior to the simple hook, or forceps. Such appears to have been the ultimate view of the subject entertained by Jüngken, who, at first, was an ardent advocate for the employment of the instrument of Gräfe, but who subsequently repudiated it in favour of the common *iris-hook*, or toothed forceps.

#### SCLERECTOMIA.

In cases in which the cornea is opaque throughout, an operation has been performed in the sclerotica, which has been named *sclerectomia*, in the hope that, by the removal of a circular portion of that tunic and of the choroid beneath, a transparent covering might be established for the transmission of light to the retina. This operation has been frequently performed in Germany, particularly by Autenrieth, (who first proposed it,) Beer, and Ammon. In this country, it has likewise been attempted by Mr. Guthrie ;—in every instance without success.

*Other cases requiring artificial pupil.*—From what I have stated, it will be seen that a great variety of proceedings have, at different times, been resorted to, by different operators, for the formation of an artificial pupil. It will, also, have been apparent, that there are other conditions which demand this operation, besides that of closed pupil after iritis ;

these conditions, indeed, are rather numerous. Thus, we find that after operations for cataract, iritis sometimes ensues, and a closure of the pupil results. In other instances, a prolapsus of a portion of the iris occurs after extraction, and the pupil is drawn towards the ciliary margin, and perhaps behind an opaque portion of the cornea. In such cases, vision will probably be restored by the excision of a portion of the iris, or by the operation of incision, as practised by Messrs. Alexander and Estlin before described. I should also state that Beer occasionally punctured the iris, when its fibres were on the stretch, with a cataract-knife, through the cornea, and thus effected an aperture.

*Operation in cases of Opacity of the cornea, &c.*—The pupil is frequently obliterated, also, by a prolapsus of the iris occurring through an ulcer of the cornea, the central portion of the iris being drawn behind the opaque cicatrix. Central opacities of the cornea, likewise, frequently obscure vision to such an extent, as to require an operation for the removal of the pupil towards its circumference. The operation to which I first alluded, viz., puncturing the cornea, and removing a portion of iris laterally, was successfully practised by Mr. Gibson in this kind of case: indeed, he has the merit of having introduced this operation in such cases. He first of all directs a puncture to be made in the margin of the cornea, with a cataract knife, to the extent of about three lines. "All pressure is now to be removed from the eye-ball, and the cataract-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 of 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 fingers 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 portion must be cut off with a pair of fine curved scissors, 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." This operation should, also, be practised in such cases of conical cornea, as may seem to require proceedings of this description.

In most cases of opacity, or other affection of the cornea, demanding the operation for artificial pupil, the lens and capsule retain their transparency; it is important, therefore, that in the performance of any opera-

tion, care be taken not to do anything that may tend to produce opacity of those structures." In this description of case, it is rarely necessary to introduce a hook for the purpose of causing a prolapsus of the iris, a little pressure on the eye being all that is requisite, sometimes, indeed, a spontaneous prolapsus taking place. If the hook have to be introduced (and this may be rendered necessary by adhesion of the iris to the inner surface of the cornea, as well as to the capsule of the lens), care must be taken that it is not allowed to come in contact with the capsule, or otherwise opacity of that texture will be produced. To prevent the possibility of such an occurrence, some advise the use of a blunt hook; but, with proper precaution, the sharp hook is the better instrument. When there is adhesion between the iris and cornea, it is sometimes requisite to introduce the iris-scissors for the purpose of separating the adhesions.

It is very difficult to lay down general rules that will apply to every variety of case requiring the formation of an artificial pupil. Generally speaking, however, I am satisfied that the operation of excision, by means of the hook, forceps, or scissors, is the best. It is the most extensively applicable of any, whether in cases of closure of the pupil, with opacity of the capsule and lens; in those of closed pupil, after removal of the lens; or in opacities of the cornea, the lens and capsule remaining transparent. It is an operation that appears to have been introduced about the same time, by two men of distinguished eminence, viz., Beer and Gibson; and they seem to have practised it very extensively, and with great success. The formation of an aperture in the iris by excision, in this manner, is so easy of performance, attended with so little suffering, and usually followed by so trifling an amount of irritation, as to make it much to be preferred to the operations of Cheselden and Adams. The latter interfere so much with the internal textures, that I should always be inclined to perform the operation, even in the case of incision, through the cornea.

I have succeeded very well in cases of closed pupil with opacity of the capsule, when the result of iritis, in the manner previously indicated, viz., by dividing the proceedings into two stages: first, the formation of an artificial pupil, by drawing out a portion of the iris through a small opening of the cornea; and then, in a few days afterwards, as soon as the irritation from the first operation has subsided, the removal of the lens by extraction.



CASE.—Mr. G., *ætat.* 68, consulted me relative to an affection of both eyes, which had materially impaired vision, so much so that he had the greatest difficulty in finding his way about, and was quite unable to read even the largest letters. The little sight he had was confined to the right eye: with the left, he could merely perceive light, and the movements of bodies passed directly before it. On looking at the eyes, it was evident they had been the subject of iritis, for the pupil of the left eye was completely obliterated, so that there was not room even for the admission of a pin-point. In the right eye, the pupil was considerably contracted and adherent to the capsule, the latter being nearly covered with an opaque deposit. The structure of the iris, in each eye, did not appear to have undergone much change, nor was there any other mark of disease existing. Under these circumstances, I advised an operation. As he would only consent to the experiment being made on the eye which possessed the least amount of vision, I was compelled to limit my proceedings to that organ. Accordingly, on the following day, with the aid of an assistant, who secured the upper lid, the patient being seated in a chair, I made a puncture with a cataract-knife into the temporal margin of the cornea, the point of the instrument reaching to the centre of the iris, when the aqueous humour escaped, and the knife was withdrawn. A small, sharp hook was then introduced through the opening of the cornea, and fixed into the centre of the iris, a portion of the latter being thus drawn out of the eye by the instrument, which was immediately laid hold of with a small pair of forceps, and snipped of with the scissors. The aperture in the iris was now observed to be full of blood, so that nothing could be ascertained as to the amount of opacity of the capsule. Strips of adhesive plaster were then brought over the closed lids, so as to keep them as much at rest as possible, and he was desired to keep himself quiet in an easy chair during the remainder of the day. The next day the effused blood was absorbed, and a good sized pupil, of oblong shape, extended from the centre to near the outer margin of the iris, behind which was observed a densely-opaque capsule, so that no improvement had as yet resulted. This operation had scarcely caused him any suffering; so that on the third day after, no inflammation having resulted, he was prepared to submit to the second stage of the proceedings. I now performed the operation of *extraction*, by making a section of the inferior half of the circumference of the cornea in the usual manner; the lens, which was of a deep amber colour, readily passing through the new pupil, and out of the wound of the cornea. I had hoped that after the extraction of the lens, the capsule, or a considerable portion thereof, would have been speedily absorbed. This, however, was not the case; such was its density, thickened no doubt by the opaque matter which had been deposited upon it, that, after waiting about three weeks, the irritation consequent on the last operation having then subsided, I resolved upon breaking it up, which I did with a cataract needle, introduced through the sclerotica in the usual way. In a few days, as soon as the eye had recovered from the effects of the third operation, which was the only one that caused him any material suffering, he went home into the

with instructions to return in about a month. At the expiration of the mentioned, I found that the pupil had again closed, and that the opaque had entirely disappeared. I now determined to repeat the operation first, viz., to remove another portion of iris. For this purpose I made a at the temporal margin of the cornea, in the site of the original wound, introduced the hook as before; but, instead of a portion of iris coming and that the hook tore through an extremely fragile structure, which more than a thin portion of capsule, and which receded under the hook, g and leaving a clear black pupil, as large as at first, and occupying the same situation. The inflammation that resulted was very slight after these operations, but especially so after those which were confined to the cornea, and forming the aperture in the iris. A slight opacity in the course of the incision of the cornea, more particularly at its outer end but not to such an extent as to interfere with the pupil. The patient was able to perceive objects with this eye, and was enabled to read large type, and his way alone. He shortly after returned home, quite satisfied with the results of the operations.

It is clearly ascertained that the capsule, or lens, is opaque, it is as well, perhaps, to join both processes in one, so as to make one nerve, by making an incision into the cornea of sufficient extent to escape of the lens; then removing a central portion of the iris, with the hook or scissors, and finally rupturing the capsule, and extracting the lens. In those cases, however, in which the capsule may retain its transparency, it will be better merely to make a puncture in the cornea, and remove a portion of iris; when, if there be no further proceedings will not be required. Whether the capsule is to be transparent, or otherwise, cannot always be determined when the pupil is very closely contracted. If opacity be discovered, then the pupil afterwards be extracted, as in the case I have just related, or it may be broken up and left to undergo absorption, according to the peculiarities of the case.

In cases of iritis, terminating in closed pupil, in which the lens may be supposed to have undergone the process of absorption, as after penetrating the cornea, or the operation for cataract, the capsule, or a portion of it, remaining behind the iris and blocking up the pupil, then the process of removing a portion of iris will usually be all that is needed, as the capsule probably undergo absorption afterwards; or, if it should not, it may be broken up with a needle, or extracted.

CASE 1.—Mrs. M., *et. 62*, applied to me in March, 1839. Three years before she had undergone several operations for cataract. The right eye had been destroyed by severe inflammation, the cornea being opaque throughout, and there was a partial degree of staphyloma. The left had been more fortunate; with it she had enjoyed some useful vision, but owing to several inflammatory attacks, she had again become nearly blind. The pupil was observed to be exceedingly contracted, and almost blocked up with opaque capsule; but the appearance of the iris, and, indeed, of the eye generally, was of a healthy description. Under these circumstances the operation of excision was resorted to. I made a puncture at the temporal margin of the cornea, carrying the point of the knife into the pupil, which was immediately followed by the discharge of the whole of the aqueous, and a considerable portion of dissolved vitreous humour; a sharp hook was then introduced through the wound into the pupil, and a portion of iris drawn out, which was cut off by the scissors. A slight degree of inflammation resulted, and the eye remained in a rather irritable condition for several weeks; but she ultimately recovered excellent vision, the pupil having been much enlarged, and the capsule nearly removed.

CASE 2.—W. L., aged 19. About three months before I saw him, whilst hammering some steel, a portion flew off and wounded his right eye, destroying its vision. Considerable inflammation resulted, for which bleeding and similar treatment were resorted to, with the effect of relieving it, but without improving his sight. When he applied to me, there was an irregular opaque cicatrix of some extent, occupying the outer portion of the cornea but not quite reaching its centre; the pupil was very small and fixed, and the iris evidently adherent to the capsule, which was opaque; the iris was but little changed in appearance, and the anterior chamber was tolerably spacious. He could discern a bright light, but otherwise possessed no vision. From the history of the case, it was evident that this had been an instance in which the lens had been injured and had probably been absorbed. It appeared to me that the best proceeding that could be adopted would be the formation of an artificial pupil, either by incising or excising a central portion of the iris, and effecting the removal of the opaque capsule. The cornea being extensively opaque at the outer margin, I punctured its lower portion with a cataract-knife, the point of the instrument being carried directly into the pupil so as to enlarge it by incision. The aqueous humour was immediately discharged, and with it the opaque capsule and a portion of lens, and a very good pupil was formed. He was now able to discern surrounding objects with this eye. I was apprehensive that the pupil might become, hereafter, again contracted, but the operation had been so successful that I determined to waive the removal of a portion of the iris. A considerable contraction did take place, and a large portion of the pupil was unfortunately shaded by the opacity at the outer portion of the cornea. At the expiration of nine days vision was far from being so good as immediately after the operation, and the patient was evidently disappointed and dissatisfied. I therefore made another puncture of the cornea at the same

point as before, and introducing a small hook, brought a portion of the pupillary margin of the iris through the wound, the result of which was a considerable increase in the size of the pupil in the downward direction, and quite away from the opaque portion of the cornea. There was some effusion of blood, which prevented me at the time from ascertaining the amount of improvement to vision, and more inflammation succeeded this than the preceding operation. In about a fortnight, however, the eye was free from irritation, the effused blood had been absorbed, and he had regained very useful vision, so much so as to be able to read with the aid of a convex glass.

The following cases afford examples of the operation for artificial pupil, rendered necessary by obscuration of the pupil from opacity and ulceration of the cornea.

**Case 1.**—Robert Newall, aged 53, applied for my advice on the 23rd of January, 1844. He stated that two years previously he had a very severe attack of ophthalmia, affecting both eyes, which continued with more or less severity for about six months, and left him in a condition of almost total darkness. The vision of the left eye had, however, somewhat improved since, as he could now discern the shadows of objects passing before him, but was unable to find his way without a guide. On examination, a central opacity of the cornea of both eyes was observed, the circumference alone remaining perfectly transparent. The conjunctiva was of a deep olive colour, arising apparently from an excessive use of nitrate of silver solution. The central portion of the iris of the right eye was adherent to the corresponding portion of the cornea, evidently caused by a penetrating ulcer of the latter texture, the pupil being obliterated. No such adhesion had taken place in the left eye, the pupil being partially visible at several points from the circumference of the cornea. The pupil appeared incapable of contraction or expansion, remaining fixed, although of moderate size.

Since the loss of his sight, he had applied several kinds of drops with a view of diminishing the opacity, but without benefit; indeed, he thought that vision had improved more since he had left off using them than previously. He was ordered to attend three days a week for the purpose of having sulphate of copper applied to the inner surface of the eye-lids. This was continued for a fortnight without any alteration in the appearance of the eyes, or any improvement of sight.

February 3rd. Having heard of the wonderful effects of hydrocyanic acid, as reported in some of the popular journals of the day, the poor man was extremely desirous of having its curative properties tested on his own eyes. I accordingly agreed to try the effects of this agent. The vapour of hydrocyanic acid, double the strength of Scheele's, was now resorted to, and was kept in contact with the eyes for about two minutes. A sense of heat was experienced, with a slight uneasiness, scarcely amounting to pain. Increased vascularity was observed, and the eyes were very watery. None of these effects were so intense as those produced by the sulphate of copper, and more quickly disappeared. This remedy was

used at first every other day, and soon every day, until the 19th of April, on which day he was admitted an in-patient of the hospital under my care.

April 20th. He was now in every respect the same as previous to the employment of the hydrocyanic acid, the opacity not having diminished in the least degree, and no more of the pupil having become visible in either eye. Having now abandoned all hope of benefit from any remedy short of an operation, and the patient being quite satisfied of the utter worthlessness of the hydrocyanic acid, I determined on making an artificial pupil in each eye. I accordingly made a puncture at the lower portion of the cornea, with an extraction-knife, drew out a portion of iris with the forceps, and snipped it off with scissors. This was done first in the right and then in the left eye. No inflammation supervened; an excellent pupil in each eye, opposite the lower and transparent portion of the cornea, was the result of the operation, and the patient was shortly restored to a very useful amount of vision, having no longer occasion for a guide.

The much-vaunted powers of the hydrocyanic acid, in opacities of the cornea, were fairly and sufficiently put to the test in this case and found valueless. I have tried it in a few others, as well as in some amaurotic cases, with the like result. I have no doubt that it may be useful in some cases in which other stimulants would act beneficially, but I am quite satisfied that a case which does not yield to ordinary stimulants will never be benefited by it. With this view of the case, we can easily account for the recoveries, (making due allowance for the exaggeration usually displayed by a certain class of practitioners,) said to have followed its employment.

CASE 2.—Samuel Galley, aged 26, from near Crewe, was admitted an in-patient of the hospital July 16th, 1844. It appeared that he had been occasionally subject to ophthalmia for many years past, and that the left eye had been destroyed nineteen years before. Two years since he was attacked with an inflammatory affection of the right eye, attended with ulceration of the cornea, which terminated in an extensive cicatrix at its inner margin. There had evidently been a penetrating ulcer at this point, for the pupil was drawn underneath and nearly obscured by the opaque portion of the cornea, a mere line of the pupillary margin being alone visible. With this eye, he had very imperfect sight, being merely able to guide himself about. The general appearance of the iris, and of the whole of the eye, was healthy.

July 27th. There appearing good reason to believe that the lens and capsule were transparent, it became a matter of some importance to select an operation which would not interfere with their integrity. As the pupil had been drawn towards the inner canthus by a prolapsus of the iris through the ulcerated portion of the cornea, so it seemed probable that if an aperture were made at the opposite margin, and a portion of the iris drawn out and left to strangulate, the pupil would be again drawn towards the centre. The following operation was therefore adopted:—A puncture was made with an extraction-knife at the outer margin of the cornea; the aqueous humour immediately escaped, and the pupil was seen

to extend itself across the centre of the eye, like a fine black line. A pair of forceps was next passed through the wound of the cornea, a piece of iris laid hold of, pulled out, and left outside the wound, forming a tumour about the size of a very large pin's head. This operation, then, had the effect of bringing the pupil quite across from near the inner to the outer margin of the cornea, and rendering the patient's vision almost as good as ever. A slight degree of inflammation succeeded to the operation, which was kept up by the strangulated portion of the iris remaining in the aperture of the cornea. At the end of the first week, the caustic pencil was applied to the projecting point; it was again applied on two different occasions at intervals of two or three days, when the tumour had disappeared.

August 24th. All irritation had now ceased. After the application of the caustic, although some portion of the prolapsed iris sloughed off, there was a degree of retraction of the iris internally, and the pupil did not extend so far towards the outer margin of the cornea; but what was lost in the horizontal was gained in the upward direction, its size now being about four lines across and two lines upwards. Vision was completely restored.

Although this case appeared to have succeeded so well at first, yet the patient returned some time afterwards, complaining that his vision had deteriorated; and, on examining the eye, the pupil was found to have considerably retracted towards the inner margin, and thence to have become materially diminished in size. It may, therefore, be considered very questionable if the plan of strangulating the portion of iris is so judicious a proceeding as that of snipping it off with the scissors. From the result, in this instance, I should be inclined in future to give the preference to the latter method. It may be presumed, likewise, that greater irritation will usually result from the iris being left strangulated, than if it be removed altogether.

After an operation for artificial pupil, particularly if the lens has been removed, vision is seldom perfectly re-established. Optical assistance will, under these circumstances, frequently be of great advantage, and the patient, so soon as all irritation has subsided, should be supplied with a suitable cataract-glass. Of course, the newly-formed pupil possesses no power of adapting itself to the varying intensity of light, so as to expand or contract according to the laws which regulate its movements in the healthy condition. Moreover, vision is frequently less perfect after an operation for artificial pupil than after one for cataract, particularly in those cases in which there has been inflammation of some of the internal textures. The reason, probably, is, that the retina frequently becomes implicated in the morbid action. This may, of course, happen in every possible degree, just as we see slight and severe attacks of iritis; and the

retina, without having its function actually destroyed, may, nevertheless, have it so much impaired, that the patient, though far from being blind, may yet possess only a limited amount of vision.

The situation of the new pupil will also, probably, have something to do with the greater or less perfection of sight. There can be no doubt, that in operating for artificial pupil, we ought always to endeavour to effect the aperture in the iris as near to the situation of the natural pupil as circumstances will allow. Any deviation from this point will be more or less prejudicial; and it is probably of little moment what direction the deviation takes, whether to the external or internal, or to the superior or inferior margin of the iris. Each of these situations has its disadvantages; if the aperture be at the upper part of the iris, then it is liable to be obscured by the superior eye-lid; if at the inferior part, it is below the ordinary axis of vision; if at the inner side, the field of view is limited by the nose; and, if at the outer side, the patient can only see perfectly at the corresponding side, and he is obliged to place objects in that direction when wishing to examine them attentively. Opposite opinions are entertained, by different authors, as to which situation is most advantageous. When circumstances permit, I prefer that the pupil be formed *either directly downwards, or midway between the outer and lower portions* of the iris. The experience of Mr. Gibson was decidedly in favour of the temporal side. He remarks on this point—"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."

Some writers caution us against making the pupil too large. There

seems to be little reason to apprehend anything on this score, since it is more difficult to procure a large pupil than a small one; sometimes from the obscurity of the cornea, at others from the tendency to contraction of the newly-formed aperture, particularly if there be much inflammation following the operation. Nor do I think that much inconvenience results when the pupil is of a considerable size, because we frequently see persons with very large pupils, who, notwithstanding, have very excellent sight.

*After treatment.*—The treatment after operations for artificial pupil is to be conducted as after other operations on the eye, viz., by repose of the organ, exclusion of light, and general antiphlogistic means. A principal object will be to prevent the recurrence of inflammation of the iris, and the consequent effusion of new matter into the pupillary opening. If inflammation result, its reduction is to be accomplished by the employment of the means described before. The use of belladonna, however, will have no effect on the newly-formed pupil. After the mere puncture of the cornea, and the withdrawal of a portion of iris, I have rarely observed any inflammation of consequence to succeed. When the lens is also extracted, more inflammation may be looked for, and more care will, therefore, be requisite.

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## SECTION VI.

### MYOSIS, OR PRETERNATURAL CONTRACTION OF THE PUPIL.

The pupil is sometimes exceedingly contracted and incapable of dilatation, without inflammation of the iris having previously existed, and, therefore, without accompanying adhesion to the capsule, or irregularity in the shape of the aperture. This condition is named *myosis*.

In some instances this affection appears to arise from spasm of the sphincter fibres, whilst in others it is, probably, owing to paralysis of the radiating fibres. Of the *spasmodic* variety, I only remember to have met with a solitary instance, and that appeared to be complicated with amaurosis of a temporary kind.

**CASE.**—A girl, eight years of age, presented herself with the eye-lids of the left side spasmodically closed, and a constant twitching motion of the fibres of the



orbicularis. On separating the lids, the sphincter fibres of the iris were apparently in a similarly excited state, the pupil contracting and slightly dilating (*hippus pupillæ*) with considerable rapidity, independently of variations of light. There was, likewise, a corresponding action of the orbicularis oris muscle of the same side, the mouth being drawn to the affected side. Her own account was, that the vision of this eye was quite gone. By the application of leeches to the temple, and the internal administration of calomel and purgatives, the disease was speedily subdued, and vision restored.

I have more frequently met with cases of myosis in which there was reason to believe that the affection owed its origin to *paralysis* of the radiated fibres, because, in some, the individuals exhibited symptoms of paralysis of other parts. This condition of the pupil ought to be regarded rather as a symptom of some affection of the brain, or of the nerves which regulate the motions of the iris, than as a disease of that texture itself. In some cases, it probably arises from irritation of the ciliary nerves, which are often implicated in the deep-seated affections of the eye, such as those of the choroid and retina. Hence it is a frequent accompaniment of amaurosis, particularly of its early stages. The treatment must be regulated according to the presumed origin of the malady; probably a mild mercurial course, with occasional purgatives, combined with counter-irritants, offers the best chances of success.

The pupil is extremely contracted during sleep, as any one may perceive by carefully raising the superior eye-lid of a sleeping infant. It is important to bear this in mind, because, if the practitioner were examining an infant in this condition, who might have some slight ailment, it is possible he might be led to regard this as a symptom of disease, when, in reality, it is only an ordinary and natural phenomenon. Contracted pupil is a common accompaniment, likewise, of inflammatory affections of the brain, cases of apoplexy, and is observed after poisonous doses of opium, and other narcotic substances; and it is usually attended with a corresponding condition of the eye-lids.

In some instances the pupil becomes exceedingly contracted, without there being any evidence of disease present. This is especially apt to be the case with watchmakers, engravers, and others who are constantly occupied with the examination of very minute or shining objects. In these individuals the pupil becomes habitually contracted, but still it always dilates to a certain extent, when under the influence of diminished light.

Such persons are usually near-sighted, and are not able to see so well as others in the dusk, or in a feeble light. It is certain, however, that the pupil, in different individuals, is of exceedingly different dimensions, and in many it is extremely small, without being attended by any defect of sight.

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## SECTION VII.

### MYOSIS FROM NON-ABSORPTION OF THE PUPILLARY MEMBRANE.

A contracted state of the pupil is sometimes met with as congenital. The iris is imperforate in the early stage of foetal life; the serous membrane passing over its entire surface, and that of the pupillary space, without interruption. The portion which stretches across the pupil is usually absorbed about the sixth or seventh month, although some writers state that they have frequently observed it at the period of birth. Sometimes, indeed, it is stated to have continued as a permanent barrier, although this is an extremely rare occurrence, so much so that I have never witnessed an instance. "When the pupillary membrane (says Mr. War drop) is not absorbed before birth, it appears in the form of an opaque web, which is easily distinguished from cataract by being vascular, by the size of the pupil being unalterable, and being on the same plane with the iris." The treatment of such a case must be the same as for congenital cataract; indeed, it would be impracticable to rupture the pupillary membrane, without, at the same time, injuring the capsule of the lens.

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## SECTION VIII.

### MYDRIASIS, OR PRETERNATURALLY DILATED PUPIL.

As well as being exceedingly contracted, the pupil is often preternaturally dilated. This condition is called *mydriasis*. A moderately dilated pupil frequently exists, particularly in children and delicate persons, without any inconvenience to vision resulting. Indeed, like the opposite, it may be considered as the natural condition in many persons;

the size of the pupil, which is exceedingly variable, being probably determined in each individual by the peculiar conformation of the eyes. In most persons, however, it is capable of being either considerably contracted, or dilated, according as the light is more or less intense. When the pupil is much dilated, and a strong light directed upon the eye produces no sensible contraction, then this is the condition to which the term mydriasis is applied. There can be little doubt that this is owing to a paralytic state of the orbicular fibres, which has been induced by some morbid action of the nerves proper to the iris. It is sometimes the result of blows, and other injuries inflicted upon the eye. Mydriasis is frequently met with, likewise, in conjunction with a paralytic condition of the levator palpebræ, and of those muscles of the globe which are supplied by the third pair of nerves. It is also a very common accompaniment of amaurosis; indeed, in the greater number of cases of the latter affection, the pupil is considerably dilated, not because there is any direct dependence of the iris upon the retina, as is commonly stated, but because the ciliary nerves are implicated in the disease which has given rise to the amaurotic condition.

Temporary mydriasis is readily induced by the application of belladonna and some other narcotics; a fact to which I have before alluded, and which renders their employment in the treatment of internal ophthalmia, and in certain operative proceedings, of so beneficial a character.

Mydriasis is usually attended with considerable confusion of vision; and hence cases of this description are apt to be indiscriminately regarded as amaurotic, when, in reality, the impairment of sight is referable to an optical defect, as is proved by the fact that if the patient be made to look through a small hole in a card, he can discern every object with the utmost distinctness.

*Treatment.*—The treatment, if the affection be evidently connected with paralysis, should consist, chiefly, in the free abstraction of blood, the internal exhibition of mercury, and the local employment of counter-irritants. When the dilated pupil is owing merely to an atonic condition of the sphincter of the iris, some writers recommend the application of *nitrate of silver to the margin of the cornea*, so as to produce a small eschar; and this, in some cases, is stated to have been an efficient remedy. Since it can only act as a stimulant, it is clear that its application, either in substance or in a strong solution, to the conjunctiva, in the ordinary

manner, will answer just as well as the method of producing an eschar, which must necessarily be followed by opacity. A temporary improvement of vision may be produced, if the retina be unaffected, as before stated, by causing the patient to look through a small aperture in a card.

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## SECTION IX.

### TREMULOUS IRIS.

There is a morbid condition, the result of internal disease or injury of the eye, in which we observe a tremulous state of the iris, so that, on the slightest movement of the globe, it is seen to undulate to and fro. Upon due consideration, it will be evident that the iris could not float about in this manner, were it not for the impulse given to it by the humours. In fact, in many of these cases, the lens is either absorbed or displaced, the vitreous body disorganized, its cells are broken up and removed, and an aqueous fluid occupies both chambers of the eye. In some cases, indeed, the undulation of the humours is quite as perceptible as that of the iris itself. Very often, the structure of the iris does not seem much changed, but the pupil usually loses its power of contraction and dilatation. The retina is frequently more or less paralysed, but in some instances vision is but slightly impaired. A tremulous state of the iris very frequently follows an operation for cataract, particularly that for solution; and it sometimes results from a blow or other injury to the eye. It is a condition which is usually irremediable.

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## SECTION X.

### VARIATIONS OF COLOUR OF THE IRIS.

It is not uncommon to notice the whole or a portion of the iris of one eye to be of a very different colour from that of the opposite; thus one is brown and the other blue: this is, in some instances, the effect of disease,—of iritis, for example,—the serous membrane remaining perma-

nently discoloured; whilst in others, there is reason to believe that it is merely a congenital peculiarity, and is, I believe, often hereditary. Large spots of a brown colour, are also observed in some individuals: they are often accompanied with some imperfection of vision, and are probably the result of absorption, the uvea being seen through the iris, just as the choroid is sometimes seen through the sclerotica, when the latter is attenuated.

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## SECTION XI.

### MORBID GROWTHS FROM THE IRIS.

Various morbid growths from the surface of the iris have been described by different authors. Some of these have been of a fleshy, and others of a fungous character. They generally proceed to the destruction of the eye, which usually becomes atrophic. Such cases have been recorded by Maitre-Jan, Delarue, Lawrence, and others.

Cases are also related by Tyrrell in which cysts were developed on the anterior surface of the iris, and which appear to have resulted from injury of the eye.

CASES.—The first case was that of a boy, who, whilst at work, had a particle of hot iron projected through the cornea and lodged in the iris, producing severe inflammation, which was with difficulty subdued; but he recovered after several weeks, with a good vision, but a slightly disfigured pupil. Some months afterwards, a small cyst was formed in connection with the injured part of the iris, and it continued gradually to increase without suffering or inconvenience, until it acquired the size of a small pea; it was attached near to the pupillary margin of the membrane and projected into the anterior chamber; it was of nearly a round figure, and the surface was shining and white, like a delicate tendinous structure. The boy was sent to the London Ophthalmic Hospital under Mr. Scott, who removed the cyst, but the patient did not retain useful vision afterwards. The second case was that of a fair and beautiful girl, about nine years of age, who had a similar tumour of the right eye: it was about the size of a small pea, glistening like tendon, of rounded figure, and attached near the margin of the pupil on the anterior surface of the membrane; it had been observed for several months, and had increased very gradually: the iris was otherwise healthy, and the vision good; but the motions of the pupil were somewhat interfered with. The disease was supposed to have arisen from injury, the eye having been struck by some bearded corn, and had been much inflamed in consequence. It was a few months after

the subsidence of the inflammation that the morbid growth from the iris was first discovered. Mr. Tyrrell made a small section at the lower part of the cornea, near to the site of the morbid growth, and drawing out the cyst and part of the iris to which it was attached, by means of a small blunt hook, cut it off with a pair of fine scissors, the pupil being left enlarged and disfigured but clear. Tedious inflammatory symptoms supervened, and vision was considerably impaired.

Mr. Dalrymple has recently reported a somewhat similar case, which occurred in his practice at the London Ophthalmic Hospital. In this instance, however, the disease appears to have come on without the occurrence of any injury to the eye.

CASE.—Hannah P. *æt.* 16, a fine healthy-looking girl, for the last six weeks previous to her admission had been rapidly losing the sight of the diseased organ, until she could only see objects, confusedly, that were placed to the left side. About three years before, she first observed a small speck at the inner border of the cornea, within the anterior chamber; it was then clear and transparent, and about the size of a pin's head; there was no pain or redness. It remained stationary until about six weeks ago, since which time it had increased rapidly, and in proportion as it had obscured the pupil the vision had declined. When admitted, the tumour had the appearance of a roundish or slightly oval body, cystiform, semi-transparent, or gelatinous looking, adherent to the ciliary border of the iris, at the inner side. It was attached also to the internal junction of the cornea and sclerotica, but its superior, outer, and part of its inferior border, appeared to be free. This body was not unlike a dislocated lens beginning to be opaque, but not so round, nor was it moveable. It occupied rather more than half the anterior chamber, extending in front of the pupil, which was nearly shut out, and dimly seen through the semi-transparent mass. In other respects, the eye was healthy; there was little or no vascularity, but the eye was irritable, with much lachrymation. The patient was put upon a slight mercurial course, with counter-irritation, the tumour slightly increasing. After the lapse of a few weeks, it was resolved to puncture the tumour, its cystiform character being more apparent from the body becoming more transparent as it increased, and it was hoped if the contents could be evacuated without discharging the aqueous fluid of the anterior chamber, the increase of this latter fluid, on the removal of the pressure of the tumour, would cause the sides of the cyst to collapse, and, perhaps, prevent its reaccumulation. A broad needle was introduced into the lower and inner part of the cyst, at the point where it seemed most adherent to the circumference of the cornea. The needle being turned upon its edge, a semi-opaline fluid, of a saponaceous feel, was evacuated, and the cyst, sensibly shrunk, left the pupil nearly wholly exposed. Two-thirds of the iris were now seen, the pupillary margin was quite free, and vision at once restored. The next day, the cyst had

filled again nearly to its former size. It gradually diminished. Seventeen days after the first operation, the needle was again introduced, and the contents of the cyst evacuated. At the end of fourteen days more, the cyst remained empty, its fine membranous walls were flattened, apparently adhering to the concave aspect of the cornea, and so transparent that the iris could be easily seen through this filmy obstruction. The pupil was round, black, and unobstructed; vision good, no irritation existing.\*

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## SECTION XII.

### WOUNDS OF THE IRIS.

These can only happen simultaneously with injury of either cornea or sclerotica. A simple incision, such as sometimes happens in an operation, is seldom productive of any material mischief. The amount of injury will usually be in proportion to that inflicted on the globe generally, or to the degree of inflammation which succeeds. The iris being very vascular, there will always be more or less effusion of blood into the anterior chamber after a wound; and, consequently, it will be imperceptible, and vision will be suspended, until after the absorption of the effused fluid. When there is much blood, and it is long in becoming absorbed, it may be regarded as an unfavourable omen, inasmuch as it implies mischief to the deeper-seated textures, as of the ciliary processes and choroid, and, probably, of the retina. The treatment of all such cases must be purely antiphlogistic, with perfect repose of the organ, and total exclusion of light; which latter objects are best insured by maintaining the margins of the palpebræ in opposition, by the aid of a slight compress and bandage, or of strips of adhesive plaster. If there be a *prolapsus of the iris* through a wound of the cornea, it must be treated as before directed in speaking of ulceration of the cornea.

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## SECTION XIII.

### SEPARATION OF THE IRIS FROM THE CILIARY LIGAMENT.

This is an occasional result of injury inflicted upon the eye, more particularly by blows. If it have been effected by great violence, vision will

\* Lancet. 1844. Vol. I, Page 713.

be often considerably impaired, or even destroyed, from the concussion being communicated to the retina. When the injury is limited to the iris, the only inconvenience complained of will probably be that of double vision, the light passing through the new aperture as well as through the natural pupil.

The form of the pupil is also frequently much changed after injuries of the eye, as after wounds of the cornea and sclerotica, from portions of the iris being displaced, and drawn into the wounded part. In some instances, the whole of the iris disappears, probably from disorganization and ultimate absorption; in others, a portion only is removed in this manner.

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#### SECTION XIV.

##### MALFORMATIONS OF THE IRIS.

Certain defects of formation are sometimes observable in the iris. The most common is that known by the appellation *coloboma iridis*. In this case the pupil is of a pyriform shape, the base being towards the centre of the iris, and the apex towards its ciliary margin. I have never observed it, except at the inferior portion of the iris; but Mr. Middlemore states that he has seen it in other directions. It is usually observed in both eyes, but a patient whom I occasionally attend has one only thus defective. There is, of course, an actual deficiency of the texture of the iris at the point where this peculiarity is noticed. It is also stated, that in many cases there is a fissure in the choroid and retina corresponding to that of the iris.

Cases.—In the case of Mrs.C.'s infant, which I had recently an opportunity of inspecting after death, no deficiency was observable except in the iris itself. This case I saw immediately after the birth of the child: the deficiency of the iris, which affected both eyes, was attended with a similar defect of the upper lip and of the palate; and on the *cornea* of one eye there was an *opacity* of about the size of a pin's-head, such as is seen to be the result of a small ulcer or pustule of that texture, affording *another instance of diseased action during the uterine period of existence*. The child lived but a few hours; and I was enabled to make a preparation of one of the eyes, which shows this peculiarity of the iris very well. In another case, a patient of my colleague, Mr. Windsor, this defect of the iris was



complicated with an opacity of the capsule of the lens in each eye, which, however, was very small, (*cataracta stellata*,) and did not appear to interfere with vision, the pupil contracting and dilating as usual.

CASE.—A singular case of *imperfect coloboma iridis*, in a male adult, came under my notice some time since, which at first sight appeared to be precisely of the above description; but, on closer inspection, it was manifest that the deficiency, which was exactly in the position, and of the size and figure of *coloboma iridis*, was confined to the anterior laminae of the iris, and that the uvea was presented to view, being of a very dark brown colour; the pupil, in reality, being perfectly round, of the natural size, and contracting and dilating in a regular manner; the rest of the iris, and eye generally, presented a natural and healthy appearance. This curious condition, beyond all question, was congenital, as the eye had never suffered from either injury or disease. It was only observed in one eye.

Other deviations from the ordinary form of the pupil are occasionally noticed: thus, in addition to a *pyriform* or *oval shape*, sometimes a *rectangular*, or other more irregular form has been witnessed; and, sometimes, a *double pupil* has been observed,—all congenital.

*Absence of the iris*.—Not only are there partial deficiencies of the iris, but we likewise occasionally meet with instances of its *entire absence*; and, in other cases, a small ring of iris around the ciliary margin is alone observable. I have witnessed several instances of total deficiency of the iris. In each, vision was evidently very imperfect, although the children seemed to notice many objects, particularly such as were lustrous. The eyes of such individuals have a dark, slate-coloured appearance, when viewed through the cornea, and they have that peculiar oscillatory motion observed in children who are born with defective vision, and are likewise much confused by exposure to a moderately powerful light. In some instances, the crystalline lens is also more or less opaque, and other morbid accompaniments are occasionally noticed. This condition may be improved by the patient being made to wear a frame fitted to the eyes, with a central aperture for the transmission of a regulated supply of light.

## CHAPTER V.

## DISEASES OF THE CHOROID.

THE choroid is by far the most vascular portion of the eye. We might, therefore, presume, *a priori*, that it was frequently the seat of inflammatory action ; and this is, indeed, the case.

## SECTION I.

## CHOROIDITIS, OR INFLAMMATION OF THE CHOROID.

Inflammation of the choroid is technically named choroiditis. I know of no means, however, of detecting its existence as a separate affection.

The choroid membrane, as I have said, is extremely vascular, and I can hardly conceive that any considerable degree of choroiditis can exist without the immediate development of symptoms both of iritis and of retinitis. The long ciliary arteries, it will be remembered, traverse the space between the choroid and sclerotica, and many of the choroidal vessels freely anastomose with those of the iris. The ciliary nerves, moreover, must also be influenced by disordered action of the vessels of the choroid. The retina, likewise, though its vessels are in some degree independent of those of the choroid, will, in many cases, necessarily become involved in the inflammatory condition of the latter texture.

Dr. Mackenzie is the first author who has ventured to give an account of choroiditis as a separate and independent affection ; but it may be reasonably doubted if he has been very successful in the attempt. The disease he has described, under this denomination, is one of a very complex character ; indeed, I have already given an account of the affection, which he terms choroiditis, under the head of *staphyloma scleroticæ*.

It is contended by Dr. Mackenzie, that the choroid inflames, becomes thickened, and, by its great pressure on the sclerotica, causes attenuation, absorption, and yielding of the latter tunic, and that thus is formed the tumour of the sclerotica, which I have described as *staphyloma* of that texture, but which he thinks should be termed *staphyloma choroidalis*. Dr. Mackenzie's reasoning does not seem to me sufficiently conclusive. I do not imagine that *staphyloma* of the sclerotica is produced by pressure of the choroid, any more than that the same condition of the cornea is produced by pressure of the iris. That inflammation of the choroid, and other internal textures, accompanies most cases of *staphyloma scleroticæ*, I have before stated; but I have no doubt that other cases occur independently of disease of the choroid; and it is equally certain that choroiditis may exist without any attenuation, or other morbid condition of the sclerotica being induced.

The function of the choroid being of such a character as to have only an indirect influence on vision, and its situation in the interior of the eye rendering it incapable of being scrutinised, we have therefore no direct means of ascertaining when it is the seat of inflammation. Some authors state, that when there is a varicose condition of the vessels on the outer surface of the globe, it may be regarded as a criterion of a similar condition of the vessels of the choroid, and such is very likely to be the case: but this only occurs in the advanced stage of a disease which has implicated the textures of the eye generally. The choroidal veins are often affected in this way to a very considerable extent; and Dr. Mackenzie states that Beer was in the habit of showing a preparation in which the varices were as large as small peas.

Displacement of the pupil upwards is also stated by Dr. Mackenzie to be one of the symptoms of choroiditis. In some instances in which internal ophthalmia has existed, no doubt the pupil may be drawn upwards; but that this is a frequent or necessary result of choroiditis is by no means clear. In many cases of inflammation of the choroid, the pupil is more likely to be contracted than otherwise, from extension of the diseased action to the iris. When the pupil is much drawn upwards, it may probably result, as Dr. Mackenzie remarks, from some of the ciliary nerves becoming paralysed, in consequence of their having participated in the morbid action. There is a point, however, in connection with this subject, which seems to have been lost sight of, which is, that the pupil,

in the normal state, is decidedly in the superior portion of the iris ; and I have often witnessed, after the application of belladonna, the pupil to be excessively dilated upwards, and but slightly so at the inferior portion ; so that I do not regard this symptom to be of as much importance in diagnosis as is attributed to it by some writers.

Many of the cases which are commonly described as amaurosis are, no doubt, cases of choroiditis, complicated with disease of the retina and iris. Inflammation of the choroid may, of course, exist in every variety of intensity and degree, and in the slighter cases vision will not be much impaired ; but it is scarcely possible that such an affection can exist, in an intense degree, without producing amaurosis, from extension of the morbid action to the retina. The symptoms of choroiditis will, therefore, in many cases, bear a certain resemblance to those of retinitis ; and, in others, the disease will extend to the iris, and be productive of those changes which are characteristic of the presence of iritis.

Although there is a difficulty in defining what are the essential symptoms necessary to constitute a case of choroiditis, yet we may readily imagine that if the choroid become inflamed, it must be speedily rendered apparent by the presence of many of the ordinary signs of ophthalmia, such as intolerance of light, lachrymation, pulsating pain in the organ, impairment of vision, and probably contraction and irregularity of the pupil. If the disordered action be violent, and continue for some time, the other textures will become implicated, and there may be complete amaurosis, with a glaucomatous condition of the humours and dilated pupil ; or there may be opacity of the capsule and lens, with contracted or irregular pupil ; a varicose condition of the ciliary vessels, both external and internal ; and in some of the more protracted or neglected cases, bulging of the sclerótica from attenuation or absorption.

*Treatment.*—In these complicated cases of internal ophthalmia, although there may be a difficulty in forming a diagnosis as respects the primary seat, or the exact focus of the diseased action, there can be none as to the treatment required for its subduction ; this must be of a decidedly anti-phlogistic character, more particularly during the active stage of the disease. Venesection, mercury, and belladonna are the agents to be specially employed, as in the case of acute iritis. In the subacute, or chronic stages, a mild mercurial action should be maintained, and counter irritation resorted to.

CASE.—W. S., about 45 years of age, somewhat corpulent, but frequently out of health from slight causes, has occasionally suffered from inflammation of the left eye, vision having been destroyed in one of these attacks. For the last five or six weeks, he had been subjected by his medical attendant to bleeding, mercury, and the usual antiphlogistic treatment, for a more than ordinarily severe attack, which had, unfortunately, resisted all attempts at relief. When he came under my notice, there was a considerable amount of vascularity about the external tunics, but it was not of an active character, the vessels being large and varicose, and of a deep-red colour; the sclerotica appeared to be but slightly affected, there being but little of the pink tint observable, and the cornea had a healthy aspect; but the pupil was considerably dilated, and the humours had a dull, glaucomatous appearance; there was but little lachrymation or intolerance of light; the pain had been of an aggravated character, deep-seated and pulsating, and had prevented him from obtaining but a very small allowance of sleep, being much increased during the night. He was considerably reduced from the suffering he had undergone, and the treatment to which he had been subjected, and his health appeared much impaired. I pointed out to him that there were two modes of treating his case; the one by removing the source of irritation, by sinking the organ which was, and had for some time been, entirely useless; the other, to palliate and endeavour to remove the morbid action, by the employment of soothing and anodyne remedies. I advised the latter method to be adopted first, and if this were not speedily successful, with a view to preserving his health from becoming still more impaired, and freeing him from pain, in the course of a short time to submit to the former. I accordingly prescribed belladonna frictions every night around the eye, calomel and opium administered internally, and the use of the tartar-emetical ointment, so as to keep up constant irritation on the temple. After this treatment had been persevered with for two or three weeks, his general health being likewise carefully attended to, there was a decided improvement in the symptoms, the pain abating, the vascularity declining, so that he was enabled, partially, to renew his attention to business.

Various morbid changes,—probably the result of continued inflammatory action,—have been described by authors as taking place in the structure of the choroid, such as absorption of its pigment, ossification of its texture, and the like; but as I have nothing to offer from my own observation on these topics, and as they are more curious than practical, I need not dwell upon them.

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## SECTION II.

## WOUNDS OF THE CHOROID.

Injuries of the choroid, and more particularly of the ciliary processes, are usually attended with considerable hæmorrhage into the chambers of the eye. The effused blood becomes absorbed after a certain time, so soon as the accompanying inflammation has subsided. As such an accident is generally accompanied with severe injury of other parts of the globe, as the sclerotica, iris, lens, and retina, there will be considerable danger to vision. The treatment must be strictly antiphlogistic.

It has been supposed by some authors, particularly Beer and Wardrop, that a wound of the ciliary processes is more certainly fatal to vision than that of almost any other texture of the eye; and, as they particularly notice the dilatation of the pupil which also occurs, it is probable that they consider the injury of the ciliary nerves, in like manner as a wound of the frontal nerve is so considered, to have some effect in paralyzing the retina. Mr. Wardrop says—"I have observed several cases of wounds which penetrated the sclerotica, followed by a complete amaurosis, accompanied with a pupil very much dilated. In such cases, it is probable that the ciliary processes were injured; affording an additional proof of the accuracy of Beer's observations on the danger of such wounds in operations of the eye." It is impossible, however, to conceive of an injury which shall be sufficient to paralyse the iris, that shall not at the same time be capable of producing the like effect upon the retina, and that whether produced immediately by the injury itself, or as a result of the inflammation succeeding it. |

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SECTION III.

## MALFORMATION OF THE CHOROID.

*Albinism.*—The only congenital defect that is frequently met with, is the absence of the pigment or colouring matter of the choroid. This state is always seen in combination with a deficiency of the colouring matter of

the skin and hair ; and persons thus affected are called *Albinos*, from their excessive whiteness. In these individuals, the eyes have a peculiar red appearance, which is communicated to them by the blood circulating in the vessels of the choroid and iris, and which is never observed when the pigment is present. They are much confused by exposure to a bright light ; a circumstance which is owing to the irregular reflection of the luminous rays in the interior of the eye, which the dark pigment, by its absorbent property, prevents, when present. It is a condition which does not admit of remedy. Albinos are very often the subject of inflammatory affections of the eye.

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## CHAPTER VI.

## DISEASES OF THE RETINA.

THE retina, it will be remembered, consists chiefly of two portions, a nervous and a vascular tissue; and its function may be impaired by a diseased condition of either. Impairment of the function of the retina, from whichever of these two sources it originates, is commonly termed *amaurosis*, from the great obscurity of vision which results. This term, however, is still more extensively employed, inasmuch as it is applied to all those conditions, either of the retina, or of any other portion of the nervous system, which are capable of impairing vision; and hence we hear of amaurosis from affections of the optic nerve, of the fifth nerve, and of the brain, as well as of the retina itself. The function of the retina, indeed, in some instances, seems to be impaired by a disordered condition of a remote organ, and to this the term *symptomatic amaurosis* is given. The term amaurosis, then, must be understood to express the more prominent symptom; viz., impairment of vision, from some affection which implicates, directly or indirectly, the retina, or its communicating nerve, or some portion of the brain with which it is connected.

Now, the retina, it is well known, possesses a considerable amount of vascularity in the normal state. We have before seen that some structures of the eye, which ordinarily possess but little of this property, become, when the subject of disease, extremely vascular. We cannot then, for a moment, doubt that the highly vascular retina is capable of becoming the seat of most intense and long-continued inflammatory action.



## SECTION I.

## RETINITIS, INFLAMMATION OF THE RETINA, OR ACTIVE AMAUROSIS.

Inflammation of the retina is technically named *retinitis*, or, if the term amaurosis be retained, the affection, when acute, should be designated *active amaurosis*. The retina, like the choroid, is placed so completely out of view, that we are unable to mark the changes which take place in its texture when it is the seat of inflammation. In this respect we are at a great disadvantage; and as we are unable to observe the alteration in the structure of the retina, our only alternative is attentively to notice the condition of its function.

*Symptoms.*—When there is evidence, then, of the existence of internal ophthalmia, which, as I before explained, is rendered apparent by the presence of *intolerance of light, lachrymation, deep seated, and throbbing pain*, and, in addition, *sudden impairment*, or even *complete loss of vision*, without any adequate affection of the iris, or of the adjacent transparent textures, then we may certainly conclude the retina is the essential seat of the disease, and that acute inflammation of that texture has been set up. In addition to impairment, or loss of vision, disorder of the function of the retina is indicated, by certain illusory appearances within or before the eye, such as *corruscations or flashes of light, coloured representations of a red, sparkling, and variegated description*, and, not unfrequently, *black moats* or clouds floating about; and these phenomena, or some of them, are usually present in most cases of retinitis.

The symptoms I have enumerated differ much in intensity and degree. In some cases, the intolerance of light is extreme, and the pain violent and even agonizing, shooting backwards into the orbit and affecting all the surrounding textures, producing considerable constitutional excitement; but this amount of suffering is by no means a constant occurrence, the irritation being sometimes confined to the affected organ, and that not being very great. In some instances, in which the suffering was most intense, I have observed that there was but little or no increase of the vascularity of the external tunics.

In the first stage of an attack of retinitis, the *pupil will be contracted*, as it usually is, during the existence of acute ophthalmia, from the general excitement of the organ. If the progress of the affection be not speedily

arrested, the inflammatory action extends to the other internal textures, and the choroid, and probably the ciliary nerves also, become implicated; and thus a degree of paralysis of the iris is occasioned, which causes the pupil to become *dilated* and *motionless*. In other instances, the inflammation, in a very early stage, attacks the structure of the iris itself, and thus the pupil may become contracted and irregular from *adhesion to the capsule of the crystalline*. Speedily, too, in the more severe attacks, lymph is deposited into the texture of the retina, just as we see similar deposits on the surface of the iris. This deposit on the retina occasions a certain amount of reflection of the luminous rays that pass through the pupil; and hence the appearance of *muddiness* and *discoloration*, instead of the natural shining black, usually presented to the eye of the surgeon when he examines a patient affected with this disease. In some instances, it is highly probable that the opacity behind the pupil may be attributable to loss of transparency of the vitreous body; and this is the more probable, in consequence of that structure being partially supplied with blood from the central artery of the retina. That changes of the description to which I allude do actually take place is not a mere matter of conjecture,—they have been frequently ascertained to exist by post-mortem examination. I have, myself, a preparation of the eye of an ox, in which the retina is seen to be much thickened, and covered over with a dense layer of coagulable lymph, which morbid condition had also extended, in a less degree, to the choroid, ciliary processes, and posterior capsule of the lens; the vitreous humour also was of a decided straw-colour, and the septa forming its capsule had entirely disappeared. These conditions were, in all likelihood, the result of active inflammation commencing in the retina, and extending to the contents of the posterior chamber generally.

*Causes.*—The causes of retinitis are by no means so clear as they seem to be regarded by some writers. Thus, we meet with frequent instances in which the disease comes on suddenly, without any perceptible cause being ascertained. In other cases, it may be traced to a direct source, such as a flash of lightning, exposure to intense light, the pressure of a hard lens, as after the operation of conching, and excessive employment of the eyes on very brilliant or minute objects. Many other causes are enumerated, as having a tendency to excite the disease, such as intoxication, the *coup de soleil* or sun-stroke injuries and affections of the brain, and the like.

*Treatment.*—The treatment of acute retinitis must be energetic in proportion to the activity of the symptoms and the dangerous character of the disease ; since, if the morbid action be not speedily arrested, such an amount of organic change may be produced as will certainly prove destructive to vision. Any considerable deposit of lymph, or even so much as to produce opacity of the texture of the retina, will be almost sure to be followed by this lamentable result.

*Blood-letting.*—If there be any form of ophthalmia, then, which calls for the free employment of the lancet, it is, beyond all others, the one in question ; and, if it is to be employed beneficially, it must be in its earliest stage, for, after deposition has taken place into the texture of the retina, particularly if to any extent, blood-letting will be resorted to under disadvantageous circumstances, and when it is less likely to benefit the patient. If the patient be seen in the early stage of the disease, we may bleed *ad deliquium*, or so as to produce a very decided diminution in the activity of the vascular system at large ; and the operation should be repeated in the course of a few hours, if no improvement of vision has previously resulted. I need scarcely observe that the quantity of blood to be removed, and the number of times that it may be abstracted from the system, differ very much in different individuals ; and the surgeon must decide these points in each particular case, weighing well the peculiarities of each, as to strength and vigour of constitution, general plethora, and the like circumstances, and regulate his proceedings accordingly.

If the constitution of the patient should be such as to contra-indicate the propriety of repeating the general blood-letting, we may then consider whether or not it will be advisable to employ this remedy topically, as by cupping or leeching. If there should be considerable local congestion of the external tunics, we may safely resort to one or both of these measures, either in addition to, or instead of, general blood-letting ; and, in some cases, we may possibly think it more prudent to substitute local for general bleeding, even in the first instance.

*Mercury.*—As in iritis, so in retinitis, the free exhibition of mercury is a measure of first-rate importance. Large doses of calomel, say five or six grains, should be administered every four or six hours, so as rapidly to affect the mouth ; when it may be discontinued, or given in smaller quantities. The employment of mercury in internal ophthalmia is by no means a recent practice, although some of our later authors appear to have

thought so. It was much extolled by Dr. Meade, who practised a century ago.

*General remedies.*—The occasional administration of purgatives must not be neglected; these, however, are only to be regarded as secondary. A state of rest, not only of the affected organ, but of the body generally, spare diet, exclusion of light and every other stimulus, are to be strictly enforced as important auxiliaries.

One of the best marked cases of acute retinitis I have witnessed is the following, and which, it will be seen, was excited by the irritation of an opaque lens, after its depression.

*CASE.*—Mr. S., a highly respectable surgeon, *æt.* 74, residing in a neighbouring county, had been compelled to retire from practice only about a year previously to his consulting me, in consequence of the failure of his sight. He was the subject of cataract in each eye; the right being perfectly useless, and with the left he was only able to see very imperfectly. He was anxious to have the opaque lens of the useless eye depressed. I stated to him that I always preferred extraction in cases similar to his own, but he persisted in desiring me to depress, which I accordingly consented to do. Although considerably advanced in years, he was of a strong constitution. He was accordingly bled from the arm the day before that of the operation. The operation of couching I performed by depressing the opaque lens below the axis of vision in the usual manner. In a few hours afterwards, pain in the eye was experienced, which increased during the night, and became so violent as to prevent sleep, and almost to distract him, as he himself expressed it. The pain was chiefly felt in the eye, but it also extended all over the right side of the head. It had, however, gradually subsided by the next morning when I saw him; but he then complained of an extremely *luminous appearance in the eye* (which had also come on during the night), *as if three candles were burning very vividly before it*, and which did not disappear by his shading the eye with his hand. On looking at the eye, there was considerable tumefaction of the palpebræ, the conjunctiva in a state of chemosis, and the cornea and anterior chamber so turbid as to prevent my seeing the condition of the pupil. As he had been previously bled from the arm, I contented myself with ordering a dozen leeches to be placed around the eye, the palpebræ to be fomented afterwards with tepid water, and to have the belladonna freely applied. Some purgative medicine had been previously exhibited. The next day the pain had nearly gone, and the luminous appearance had also much diminished; the cornea had become clear, and the pupil distinctly seen in a contracted state. The usual antiphlogistic remedies were persevered with, and mercury was also administered so as to affect the mouth. The inflammation gradually subsided; the pupil was kept expanded by the use of the belladonna; and neither opaque lens or capsule was visible; but there was no return of vision, the eye having

been left perfectly amaurotic. Six months after the operation was performed, the eye, although it continued perfectly clear to outward view, had not regained its function.

In the following case, the disease was induced by the action of the sun's rays through a powerful microscope.

CASE.—Mr. G., a gentleman well-known for his remarkable skill in minute and microscopical dissection, was engaged in dissecting the nerves of the human tongue, under a powerful microscope, and in a situation exposed to the full influence of the sun, which, although occasionally obscured, burst forth at times with great power. The nerves, having been clearly dissected, were of a dazzling white, and whilst he was intently regarding them through the microscope, the sun shone forth with all its brilliancy upon them. Acute pain was instantly felt in the eye, pervading the whole globe, so severe as to cause Mr. G. to start back and utter an exclamation. For some time he was unable to see anything with that eye, the spectrum of the sun continuing before it whether closed or open. In about twenty minutes, however, this, as well as the pain, had sufficiently subsided to enable him to resume work with the other eye, but the injured organ was not free from uneasiness until the evening. The next day, the eye was again incautiously exposed in the same way as before. This time the shock was excessively great, and deeply-seated pain, pervading the whole globe, with much intolerance of light set in, and the spectrum of the sun was most distressing. The symptoms increased in severity during the next two days, when he was seen by Mr. Cooper. At this time, there was acute, deep-seated pain in the eye; exquisite tenderness, especially at the upper half of the globe; great intolerance of light; profuse lachrymation; luminous spectra; pupil contracted; conjunctiva slightly injected; pulse feeble and irritable; general weakness and mental depression. He was removed to bed in a darkened room, and ordered to apply twelve leeches around the eye, to foment, and to take a purgative pill and dose. Mercury, which always disagreed with him, was therefore obliged to be used sparingly. Mercurial ointment with opium was rubbed on the brow, and *pillul. hydrarg. with conium* ordered at night, with antimonial salines at intervals. Under this treatment the eye gradually recovered.\*

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## SECTION II.

### AMAUROSIS FROM CHRONIC RETINITIS.

Retinitis, though occasionally witnessed in the acute form just described,

\* From a paper, read by Mr. W. W. Cooper, to the Royal Medical and Chirurgical Society of London, June 25th, 1844.

is commonly observed of a more subdued and chronic character ; it may, however, begin actively and gradually decline in intensity, until it assume the passive character under notice.

*Symptoms.*—In many cases of this, the most common variety of amaurosis, there is little more than the ordinary amount of vascularity of the globe ; the pupil is frequently unaltered in size, although its mobility is apt to be more or less impaired ; there is often little or no opacity behind the pupil ; and the eye generally exhibits very little morbid appearance. In other instances, there are evident marks of increased vascular action, the vessels sometimes exhibiting a peculiar paleness, being remarkably fine and of a straw colour ; the pupil in a medium state of dilatation, and not acted on by the stimulus of light ; and the retina, or perhaps the vitreous humour, assuming a slight muddy or glaucomatous condition. In other cases, again, the only deviation from the healthy aspect is a dilated and inactive pupil. The appearances which I have just detailed are those most commonly observed in the organ itself, when it is the subject of chronic retinitis.

In this condition, vision gradually fails, objects at first looking misty and confused, and afterwards becoming more and more imperceptible ; sometimes only portions of any object being discernible, whilst, at others, double vision exists. Various illusive appearances are often present, such as those termed *muscæ volitantes*,—dark, moving objects which seem to float in the atmosphere, generally small and often numerous, but sometimes fixed, large, and solitary (*scotoma*), like a black cloud before the eye ; occasionally, also, sparks of fire and other luminous spectra are perceptible.

In but few instances does it happen that there is much suffering experienced during the progress of chronic retinitis ; the pain which is felt being usually referred to the neighbouring parts, such as the frontal and temporal regions ; and occasionally the patient complains of pain, giddiness, and of a sense of heaviness of the head.

The degree in which vision becomes affected, I have said, is exceedingly variable ; sometimes, portions only of the retina are the subject of disordered action, and the imperfection of vision is but partial. Thus, we often find that an individual on looking directly at an object is unable to discern it, but if he direct the eye to an adjacent point, the object is perceived, proving that the portion of the retina which corresponds to the axis of the eye is insensible. In doing this, an effort is made to throw

the image on a different part of the retina which is less affected than the central portion, the one generally employed for this purpose; and Professor Rosas states, that he has ascertained, by post-mortem examinations, that the central portion of the retina is most frequently the seat of opacity, and other morbid changes, as might indeed have been anticipated, from the almost incessant employment to which it is subjected. It is very likely that *strabismus*, which is a frequent accompaniment of amaurosis, is often originated in this way. In this case, the patient finds that by directing the eye obliquely towards an object, so as to cause its image to be depicted at a point more or less remote from the centre of the retina, he obtains a more correct view, and comes at length habitually to employ the eye in this manner; and hence, probably, the reason that so many weak eyes are thus affected, and that central opacities of the cornea lead to the like result.

In many cases, the retina generally becomes implicated in the morbid action, and the effect on the visual function will vary according to its intensity, so that impairment of vision may exist in every possible degree, at first very slight (*amblyopia*), gradually failing as the disease extends, until it is at length altogether annihilated. This complete and perfect degree of amaurosis is termed *gutta serena*, and when it exists, imparts to the physiognomy of the patient that peculiar vacant stare which is so strikingly characteristic of the affection.

The condition of the pupil, even in cases of total loss of vision, is very uncertain, sometimes being of the natural size, and at others widely dilated. In many cases, also, in which vision is totally lost in both eyes, the pupil of each will differ very materially, one being contracted and the other dilated, proving that some other condition than that of the retina determines the size of that aperture. Most commonly the iris is motionless, but occasionally acts with the utmost vivacity, even when both eyes are totally amaurotic. If one eye only is affected, the pupil is usually immoveable when it alone is exposed to light; but if both are open, then the pupil of the affected organ frequently acts in unison with the other. I have known instances in which one eye was completely amaurotic, the pupil being at the same time perfectly active; whilst the vision of the other was unimpaired, the pupil being dilated and motionless; constituting a case of paralysis of the retina in one eye, and of the iris in the other. It frequently happens, likewise, as I before stated, notwithstanding that

vision is totally destroyed in both eyes, that the pupils act with the utmost regularity on exposure to light. In these instances, we have ample proof that the disease has been confined to the retina, and that the iris and ciliary nerves have not been implicated. Considerable irregularity in the shape of the pupil is also frequently witnessed, when there is no appearance of deposit on the capsule of the lens, although it is quite possible that in some cases there may be slight adhesions between the latter and the posterior surface of the iris. When no adhesions exist, this phenomenon is most probably owing to paralysis of some of the ciliary nerves.

Sometimes there is an involuntary rolling motion of the eyes, and this is more particularly observable in those cases in which the amaurosis is owing to some congenital disease; but it is not uncommon to witness it also, to a certain extent, even in persons who have been attacked during the adult period of existence. In some instances of the latter, I have noticed it in so slight a degree as scarcely to be perceived without close inspection. This involuntary movement is commonly thought to be owing to the eyes being incessantly in search of light,—a thirst for light, as it has been fancifully termed,—but as it is observed in cases of the most complete amaurosis, and is not always present even in congenital cases, I think it should be regarded rather as the result of some affection of the motor nerves, either in the brain or in their passage through the orbit.

The symptoms I have enumerated are all referrible to some morbid condition of the retina, or some other portion of the nervous system of the eye. Diseased action, however, being once established in the retina, will often be communicated to the other textures; and hence we frequently find that amaurosis is complicated with cataract, fluidity or discoloration of the vitreous humour, varicosity of the internal and external vessels, attenuation or absorption of the sclerotic coat, as well as other morbid conditions which indicate general disease of the globe.

*Treatment.*—The treatment of chronic retinitis must be regulated by the amount of increased vascular action, the length of time which the morbid action has continued, and the condition of the patient generally.

*Blood-letting.*—If there be little or no appearance of increased vascularity about the organ, and the impairment of the function of the retina have existed for some time, and more particularly if the constitution of the patient be not very robust, we shall rarely be called upon to employ



blood-letting, either generally or locally. If, on the other hand, there is evidence of the existence of increased vascularity, or a decided tendency to congestion, and the patient be not of an enfeebled constitution, topical bleeding, either by cupping or the application of leeches, will be proper; but still it must not be resorted to without considerable caution.

*Counter-irritation.*—In this form of amaurosis, we shall usually find that the only drain from the system that can safely be established is by counter-irritation, as by the use of seton, issue, perpetual blister, or tartar-emetiic ointment. There are instances, indeed, in which any discharge of this description cannot be instituted without risk of increasing the defect of vision; but of these I shall speak more particularly hereafter, only adding now, that it is of the utmost importance to abstain from any depletory remedies, in those cases in which the constitution of the patient is of a feeble and depressed character.

*Mercury.*—The internal exhibition of mercury, there is every reason to believe, is the most efficient mode of treating chronic retinitis. Eight or ten grains of blue pill, or four grains of calomel, should be given night and morning, until the gums are decidedly tender; and the mercurial action should be kept up in a more or less mitigated form, for several weeks, if no great improvement previously result. Whether mercury act directly by increasing the action of the absorbents, or indirectly by producing a different action (counter-irritation) in the system, is uncertain. Were it ascertained that the use of this remedy consisted in promoting the direct action of the absorbents, we should be encouraged to employ it more freely in cases of chronic disease of the retina, because we might then expect that it would be serviceable in removing any opaque deposits in its texture. But, if we are to judge from the little effect it produces in cases of opaque deposit on the capsule of the lens, we shall hardly be warranted in expecting much advantage from its employment in any case in which there is an actual deposit of lymph into the texture of the retina, and particularly if not of very recent formation. The latter tissue, however, is not precisely analogous to that of the capsule, and opacities of the retina may, therefore, be more frequently removed by proper treatment. In whatever way mercury operate, we have frequent proofs of its great value in the treatment of internal ophthalmia, especially when exhibited at an early period of the disease; so that we ought never to dismiss a case in which any reasonable prospect of benefit offers, without giving this remedy a full and *fair trial*.

*General Remedies.*—In addition to the before-mentioned remedies, we shall often find considerable advantage from the judicious employment of various auxiliaries; such as the occasional exhibition of purgative medicines, as well as of such as act by exciting the functions of the skin and kidneys. The particular substances to be prescribed for producing these effects I need not detail, inasmuch as the peculiarities of the individual patient will always best guide the judgment of the intelligent practitioner.

*Emetics and nauseating medicines* were, at one time, very freely employed in the treatment of amaurosis, more particularly by Continental practitioners. Remedies of this class are evidently best adapted to the early or acute stage of the disease, and may, sometimes, be beneficially prescribed, with a view to diminish vascular action, particularly when blood-letting is contra-indicated, but they are rarely resorted to by British practitioners in the chronic stage; nor is it easy to perceive on what principle their employment can be serviceable, except in cases in which there is an obvious derangement of the gastric functions.

*Tonics.*—When the patient is of a delicate, and more particularly of a strumous habit, the exhibition of tonics should form an important portion of the treatment. In individuals of this description, it usually happens that inflammation is of a less active, but, at the same time, of a more enduring character. We may, therefore, presume that such remedies as have a tendency to improve the general condition of the system, must also have a useful effect in controlling the disordered action which results from this peculiarity of constitution. Of this class of remedies, those most likely to be beneficially employed are quinine, chalybeate preparations, the cold bath, nourishing and stimulating diet, warm clothing, country air, a sea-voyage, and, when practicable, a residence in a warmer climate. The late Mr. Tyrrell was of opinion that the peculiar effects of mercury were better produced and sustained, when the energies of the system were supported by generous diet and tonic treatment.

*Stimulants.*—In an advanced stage, when all appearance of inflammation has subsided, and vision, nevertheless, is not restored, or but imperfectly so, it is the custom with some practitioners to have recourse to powerful stimulants, such as *camphor*, *phosphorus*, *ether*, and *strychnine*. Various local stimulants have also been recommended, such as *spirit of wine*, the vapour of *liquor ammoniæ*, *nitrate of silver*, *sulphate of copper*,

and the like. These remedies are applied to the conjunctival surface, and, in some instances, I have known them to be productive of benefit. *Electricity* and *galvanism* have been also highly extolled in these circumstances, and may sometimes be serviceable. *Strychnia* has likewise been much employed of late as an external stimulant, under the impression, probably, that it, like electricity, acts in some peculiar manner upon the nervous system. The endermic method is usually preferred. For this purpose a blister is applied either to the temple or to the forehead; and, after the cuticle is removed, a small quantity of the strychnine,—about a quarter of a grain,—is sprinkled over the raw surface; and this is repeated once in twenty-four hours, the quantity being gradually increased to two grains. This medicine sometimes acts so powerfully on the nervous system, as to produce spasmodic twitchings of the muscles, vertigo, and other disagreeable symptoms, so that considerable caution is requisite in its employment. The accounts of various practitioners, as to its curative effects, are exceedingly variable; some praising it very highly, and others placing no reliance on it whatever. Although I have frequently witnessed its application, yet I have never been so fortunate as to observe any really useful results; having, however, it must be stated, never employed it, except in cases that had resisted the use of ordinary remedies.

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### SECTION III.

#### SYMPATHETIC OR FUNCTIONAL AMAUROSIS.

I have already given a general account of the nature and treatment of amaurosis, when dependent upon disordered vascular action of the retina. Very similar phenomena to those before described as characteristic of the physiological symptoms of that disease, are, however, sometimes witnessed in cases in which there is not the least appearance of inflammatory action within the eye; in this event, the defective vision will probably be the result of some disorder either of the optic nerve, or of the brain, or, perhaps, of the fifth nerve, and the disease is then termed *sympathetic* or *functional amaurosis*.

In all cases of amaurosis, then, in which there is no evidence of diseased action having existed in the structures of the eye, we ought next to direct

our attention to the condition of the nervous system generally, and especially to that portion which is directly connected with the function of sight, such as the optic and trigeminal nerves, and the brain itself. When amaurosis arises from some disease of the nervous system, it is usually of a chronic character, coming on insidiously, and progressing slowly; thus it frequently appears to be owing to congestion and chronic inflammation of the brain, tumours pressing on some portion of the optic nerves, or of the optic thalami, and the like. The portions of the brain most commonly affected in amaurosis are the optic thalami and corpora quadrigemina; but "degenerations (as Müller observes) in the most various parts of the brain, which appear, from experiment, to have no immediate connection with the central organs of the sense of vision, nevertheless frequently cause blindness." The pathology of cerebral amaurosis is, indeed, exceedingly obscure; and the brain will sometimes be extensively diseased, without any imperfection of vision resulting. "Considering the almost universal presence of disease in the brain and its membranes (says Dr. Conolly, in a recent report of the Hanwell Asylum) attended with considerable effusions of serum, the absence of pain or disorder of the vision or hearing, in a majority of the patients, seems remarkable."

Usually, however, in cases of amaurosis from affection of the brain, certain symptoms are observed which are clearly referrible to some morbid condition of that organ, such as pain in the head, vertigo, and sometimes paralysis of other parts, as loss of sensation, or of power over the muscles of the face, or of the eye-lids, as denoted by a twist of the mouth, ptosis, or lagophthalmos: in children, too, amaurosis is often accompanied with the ordinary symptoms of hydrocephalus. In all these instances there is the same variety as to the extent to which vision is impaired, the paralytic or healthy condition of the iris, strabismus, and the other attendant symptoms before spoken of, when alluding to the subject of amaurosis from affection of the retina.

Sympathetic amaurosis is sometimes occasioned by the agency of narcotic and other poisonous substances, such as digitalis, stramonium, belladonna, tobacco, opium, and lead. These, of course, produce their effects directly on the brain, and only indirectly on the eye.

*Treatment.*—The treatment of this variety of amaurosis is, in fact, the treatment of the cerebral affection. Having ascertained, as far as is practicable, the nature of the morbid action in the brain, our best endeavours

must be employed to effect its removal ; if there be congestion, or chronic inflammation of the brain existing, blood-letting, either by venesection, cupping, or the application of leeches, will be demanded to an extent varying with the intensity and duration of the disease, and the strength and vigour of the patient ; the internal exhibition of mercury is of first-rate importance ; counter-irritation, by seton, issue, or other efficient means, must also be kept up, and a free discharge maintained. In some cases, however, the disease, as before remarked, occurs in very delicate and emaciated persons ; in such we should do no good by adopting this line of treatment, and we can only temporize and endeavour to improve the general health.

The following is a case of frequent occurrence, probably arising from congestion of the retina or optic nerve, or of the adjacent cerebral structure.

CASE.—W. D. aged 37, a coachman, was admitted an out-patient of the hospital on the 13th of January. He complained of complete loss of vision of the left eye : this was so complete, that, on closing the other eye, he could scarcely perceive light from darkness. He first observed the imperfection about a week previously, and it rapidly progressed to its present condition. No vascularity of either the external or internal tunics could be detected. He mentioned that he had pain across the forehead, not aggravated at night ; and that he was troubled by the floating of "black motes" before the eye ; did not recollect that he had felt dizziness in stooping or at any other time. The pupil of the affected eye was dilated, and acted in association with, but not independently of, the other. His habits had been temperate, and his health generally good. The following remedies were ordered.—Eight ounces of blood to be taken by cupping from the left temple ; a powder of calomel and jalap every second morning ; and a pill, containing two grains of calomel with half a grain of opium, three times a day.

16th. No improvement had resulted. He now remembers that, on several occasions, he had felt slight giddiness of the head. Ordered to continue the pills, and to apply a blister to the temple of the affected side, to be kept discharging.

19th. The gums were decidedly sore. On awakening yesterday morning, he was much gratified in being able to discover the bed-posts with the affected eye. He could now recognize any large and dark object, but could not so well distinguish those that are bright or luminous. The calomel was ordered to be taken in half the quantity first prescribed.

22nd. Improving. Could distinguish any object with the affected eye, but is much incommoded in looking at a luminous one. Ordered to take one grain of calomel, with a quarter of a grain of opium, twice a day.

27th. Vision much improved. Could make out the letters on his prescription paper, but could not read them. Vision best in an oblique direction. To continue the remedies.

31st Could now distinctly trace the letters on the paper. The pupil of the affected eye was now found to act independently of the other. From this time he gradually improved, and was shortly dismissed, having regained his former perfection of vision.

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#### SECTION IV.

##### SYMPTOMATIC AMAUROSIS.

Amaurosis, as I have said, is sometimes symptomatic of a disordered condition of some more remote organ, as the stomach, intestines, or the uterus; when there is no appearance of disease of the retina, and no sufficient indication of cerebral mischief to account for the defect of vision, we must try to discover whether or not some of the abdominal viscera be the seat of morbid action. Numerous visceral derangements are considered competent to the production of amaurosis; among these may be mentioned worms, indigestion, irregularity of the menstrual function, hysteria, and the like. That amaurosis is a frequent accompaniment of these morbid conditions there can be no doubt, but it is doubtful if the retina be ever influenced in this manner, except through the medium of the brain itself, the paralysis of the retina being to be regarded as resulting from disordered action of the brain. It may be a question, how far the retina can be affected through the medium of the sympathetic nerve, but at present we have no sufficient data to reason upon. The proper mode of remedying this variety of amaurosis, is by restoring the healthy function of the organ to whose derangement the impairment of vision seems referrible; the means to be adopted are necessarily various, depending on peculiarities of age, sex, constitution, condition of the affected organ, and the like. It is not my intention, however, to enter upon the nature and treatment of the various morbid conditions which I have mentioned as giving rise to symptomatic amaurosis; I can only refer to the proper authorities for suitable information. Some very elaborate essays have been recently published in the journals, by Dr. Hocken, on symptomatic amaurosis, particularly from hysteria, to which the reader is referred. His volume on the same subject is also worthy of attention.

## SECTION V.

## AMAUROSIS FROM AFFECTION OF THE FIFTH NERVE.

Amaurosis, as I have previously stated, is sometimes caused by disorder of the fifth nerve. Now, the influence of the trigeminal nerve on the function of vision, is, in some cases, very marked. Thus, in the experiments of Magendie, when this nerve was divided within the cranium, all sensibility to light appeared to be destroyed, and vision was speedily annihilated, from the disorganization of the eye which resulted; and cases have occasionally been met with in which extensive ulceration and sloughing of the cornea, appeared to be the result of disease of the fifth nerve. We are not, however, to imagine, as Magendie at one time almost persuaded himself, that the fifth is really the nerve of sight. Disease or injury of the trigeminal nerve is prejudicial to vision in only an indirect manner, viz., by destroying common sensation, and by putting a stop to the process of nutrition in the organ.

The ordinary mode in which amaurosis is induced by the agency of the fifth, is in the occurrence of injury of some of the branches of that nerve, and more particularly of the frontal branch. Many cases are recorded in which this branch has been either wounded or injured by blows on the forehead, and amaurosis been the result. In some of these, on dividing the nerve, as it emerges from the supra-orbital foramen, the eye has been found completely to recover its function. I quite agree with Mr. Middlemore in thinking, that in many cases of amaurosis, said to have arisen from this cause, the disease ought rather to have been referred to the simultaneous concussion of the nervous matter of the retina, than simply to injury of the frontal nerve. It is, however, quite certain, that injury of that nerve will sometimes produce a corresponding affection of the nerves of the iris, because of their immediate connection; and we know, that if the iris be paralysed, vision is often much impaired in consequence. In order to have perfect vision, every portion of the organ must retain its integrity; and the imperfection of sight usually noticed in these cases is, I think, generally speaking, rather to be referred to a paralytic condition of the iris than of the retina. At all events, there is, in most instances, I believe, paralysis of the iris. Indeed, Dr. Mackenzie mentions a case in which there had been a wound of the frontal nerve, accompanied by

mydriasis and impaired vision ; but, on looking through a small hole in a card, the patient could see very distinctly. Mr. Wardrop remarks on this subject : " I have always observed a great dilatation of the pupil in those cases where vision has been destroyed by a wound of the frontal nerve ; an effect which may probably be accounted for from the connection which the frontal branch of the fifth pair of nerves has with the nerves of the iris." This view appears to be further supported by the well-known fact, that belladonna, when applied to the branches of the frontal nerve, produces paralysis of the iris.

The effects of blows or other injuries in the neighbourhood of the eye, are exceedingly various ; sometimes the retina being paralysed, sometimes the iris, and at others the lens is rendered opaque ; and vision will be impaired from any of these causes. It is very common for medical men, if they see a case of dilated pupil with imperfect vision, to set it down at once as a case of amaurosis, without inquiring how far the disturbance of vision is the result of paralysis of the iris, and whether the retina may be only secondarily affected. I repeat, then, that when there is paralysis of the retina accompanying dilated pupil, in this description of case, we are to regard the former as, in all probability, resulting from concussion of its texture, or of that of the optic nerve, or of the brain.

CASES.—A case is recorded by Professor Galenzowski, of Wilna, of amaurosis having been occasioned by the irritation of a carious tooth, in which a small splinter of wood had been lodged ; after the removal of the tooth, sensibility to light was speedily restored, and, nine days afterwards, vision was perfect, notwithstanding that the eye had been amaurotic during a period of thirteen months. Instances have likewise been narrated in which amaurosis was induced by still more trifling sources of irritation, such as the presence of an inverted eyelash, tumour of the lid, and the like ; and, in these, the removal of the irritating body was followed by restoration of sight. In all these cases, the irritation must have been transmitted through the branches of the fifth pair.

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## SECTION VI.

### AMAUROSIS FROM GENERAL DEBILITY.

Occasionally, in very feeble, delicate individuals, particularly those who have been subject to hæmorrhage, profuse salivation, typhus fever, and



other debilitating causes, a species of amaurosis is observed, which seems to arise from atony of the retina, no doubt depending upon general debility, as denoted by a feeble condition of the circulating system. It is most frequently noticed in delicate females, or such as have suckled their offspring during an unusually protracted period of time, or who have been insufficiently nourished, and perhaps compelled to exert themselves beyond their strength. Such persons find their vision temporarily improved after a hearty meal, or the use of stimulating liquors or wine, and proportionably injured by deficiency of food, or any cause which has a tendency to depress the energies of the system. In them we must be especially cautious as to the treatment to be recommended, inasmuch as if we were to prescribe blood-letting, and other depleting remedies, we should render the condition of the patient infinitely worse than before. It is common to find persons complaining that their sight has been much impaired by the loss of blood, which they have sustained from the employment of leeches around or near the eyes, which had been advised for the removal of some ophthalmic affection; and others, again, expressing their fears that if blood-letting be had recourse to, it will be at the risk of damaging their vision. Very often there is not the least foundation for this opinion, inasmuch as the defective vision is the result of inflammatory action producing opacity of some of the transparent textures of the eye; but, in some cases, I am quite satisfied that real injury is done by the too liberal and indiscriminate use of bleeding in every form and variety of ophthalmia, and in every kind of constitution, and that the popular opinion on this subject is frequently correct. We know that the loss of blood has a material influence on the nervous system generally, and that the organs of the senses are temporarily paralysed whenever syncope is produced, for the sight fails, and the other senses are suspended in that condition. We cannot doubt, then, that depressing agents generally,—not merely the loss of blood, but other discharges from the system,—must have an injurious influence on the function of sight, and will often bring on, slowly and insidiously, an effect more lasting, but of similar character, to that produced by loss of blood in ordinary syncope.

Among amaurotic patients, there will sometimes be considerable difficulty in satisfying ourselves as to the kind of case we have to treat,—whether it be one that has arisen from an enfeebled condition of the general system, or whether the amaurosis be the result of organic change

in the structure of the retina, or of some portion of the brain or nervous system ; and, as a consequence, we are at a loss to decide on the most appropriate treatment. In such instances, it is better to trust to the internal exhibition of mercury, carefully avoiding the production of salivation, at the same time improving the general health by good nourishing diet, tonic medicines, as quinine, preparations of iron, and the mineral acids, country air, sea-bathing, and the like. If there should be any leucorrhœal or other debilitating discharge, this should be checked by every suitable means, and if suckling have been continued, it must be at once put a stop to. In these cases, though counter-irritation may be serviceable, yet it ought not to be of such a character as to produce any considerable discharge ; hence issues and setons are not to be commended, but instead, sinapisms or stimulating liniments, to the temple or nape of the neck, are to be preferred.

Amaurosis not only occurs in various constitutions, but at all ages, among the old, at the middle period of life, in youth, infancy, and is not unfrequently congenital and even hereditary. When it occurs in infancy, it is most commonly a result of inflammatory action in the brain, or hydrocephalus. When congenital, it is probably owing, in most instances, to some defect in the conformation of the brain, or some portion of the nervous system connected with the visual apparatus ; in other cases, it may be the consequence of some congenital disease such as is met with in infancy, and is invariably permanent.

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## SECTION VII.

### HEMIOPIA.

A peculiar variety of amaurosis is occasionally met with, in which one half of an object is alone visible to the patient. This is accordingly named *hemioopia*. Sometimes both eyes are thus affected, but, more commonly, at least in my experience, the disease is confined to one. It is usually the lateral half of the object that is invisible, and more frequently the half next to the nose ; but sometimes the lower or upper half is wanting. Generally there is some cerebral disturbance accompanying the attack, such as vertigo, or head-ache. This may be either primary, or a

consequence of sympathy with some other affection, as disorder of the digestive organs, affection of the nervous system, disturbance of the uterine function, pregnancy, and the like. The disease may also be excited directly by excessive use of the eye, as from too close application to reading or writing. The treatment is to be conducted on the principles before explained for the management of amaurosis. A few examples will serve best to illustrate the nature and treatment of this affection.

CASE 1.—Miss R., about 30 years of age, consulted me on the 28th of December, 1842. She complained that on looking at any object with her *left* eye, she could only see one-half of it. The defect was on the side nearest the nose, and had existed about a month. She had occasionally been troubled with slight vertigo and some pain in the head. She had often been ailing, and had had several epileptic attacks, but not very recently. There was nothing unnatural in the appearance of either eye, and the vision of the right was perfect. Her general health was apparently unaffected. I advised her to live abstemiously, to be cupped on the left temple, to take a pill containing calomel and rhubarb every night, and a draught of infusion of roses with sulphate of magnesia every morning. I also advised a total abstinence from reading, sewing, or other close application of the eyes.

January 7, 1843. She had not been cupped, through fear of the operation, but had taken the medicines. There was no alteration in the symptoms, but the pain in the head had somewhat abated. A blister was ordered to the left temple, and the medicines to be continued.

January 16.—There was a slight improvement; she could now perceive the outline of the missing half of the object, but very imperfectly however. I again urged the necessity of the cupping, and advised the continuance of the medicines.

February 1.—Had been cupped since her last visit, and with the best effects. Vision was now so much improved that the entire object was distinctly seen. Her general health was very good. I advised the medicine to be taken less frequently, but not to be discontinued at once. She has had no return of the disease up to this time.

CASE 2.—Mr. H., a young gentleman of very temperate and regular habits, æt. 22, whilst residing in London during the last winter, studying to qualify for examination in the law, found the vision in his *left* eye to become much affected. When attempting to read a name, with this eye, the right half appeared to be cut off, and the right half of every object appeared lost in a black cloud. He had been frequently troubled with pain across the brow over this eye, and along the temple and side of the head, which was increased by taking stimulating food or drinks. He had been occasionally dyspeptic and habitually costive, but otherwise his health had been generally good. The eye was perfectly healthy in appear-

ance, perhaps there was a very slight increase of redness of the conjunctiva, but nothing noticeable, and the pupil very active. The other eye was free from the defect. He had been much occupied, during the winter evenings, with reading and writing by gas-light, and this was the only cause that could be assigned for the malady. It was full six months since he first noticed it, before he applied to me for advice. I recommended cupping on the temple of the affected side to about twelve ounces of blood, and, in addition, prescribed two pills, consisting of three grains of calomel and the compound rhubarb pill, every night, and a draught of the compound senna mixture every or every other morning. I also advised my patient to refrain from reading or writing. In about a fortnight after this, there appeared to be a slight improvement, the obscurity being less in extent and of less density. The head-ache and dyspeptic symptoms had much abated. I again advised the use of the cupping glasses, and a continuance of the medicines. The improvement being still but slight, I urged the propriety of leaving business for a short time, making little journeys occasionally, visiting the sea-side, and taking a short voyage. This was done for a few weeks with advantage. The indistinctness, however, continued; it had abated, but had not declined to any very great extent. A slight mercurial course was again tried, with blisters alternately to the temple and behind the ear. Cupping was likewise again resorted to. The obscurity, though much diminished, has not as yet been entirely removed.

In the preceding cases, one eye only was the subject of this disease. In others both are thus affected. Dr. Woollaston supposed that it arose from some morbid condition of one of the optic thalami within the brain, and imagining, in common with Sir Isaac Newton, that each optic nerve must be regarded as consisting of two portions, one half from the right thalamus and the other from the left, he considered the loss of half the field of vision in each eye to be thus accounted for. If this view be correct, it would seem that when both eyes are thus affected, the disease has originated within the brain; and that, when one eye only is affected, it is confined to the retina.

CASE 1.—Dr. Woollaston was twice attacked with this disease, at an interval of twenty years. The first was the consequence of violent exercise. He suddenly found that he could see but half the face of a man whom he met; and it was the same with every other object he looked at. In attempting to read the name JOHNSON over a door, he saw only SON; the commencement of the name being wholly obliterated from view. The loss of sight was towards the *left*, and was the same whether he looked with the right eye or the left. The blindness was not so complete as to amount to absolute blackness, but was a shaded darkness without definite outline. The complaint was of short duration, and in about a quarter of

an hour might be said to be wholly gone, having receded with a gradual motion from the centre of vision obliquely upwards towards the left. The second attack lasted about twenty minutes. The blindness was in this instance the reverse of the former, being to the *right* instead of the left.

CASE 2.—Mr. Abernethy was one day riding, when the horse suddenly threw up his head and struck him on the nose, which was followed by considerable hæmorrhage. He soon perceived an imperfection in his sight; he could not see more than two thirds of an object, "I ascertained this (says he) particularly as I went home, because if I saw such a long name as my own, for instance, A-BER-NE-THY, in a bookseller's shop window, or any such place, I could see A-BER-KNEE, but I could not see the TIGH at all. Well, I looked with one eye, then I looked with the other, and I looked with both, but still I perceived that the third of every object was eclipsed, on what I may call my *right* side." Mr. A considered that the brain was not affected in these cases, but attributed the phenomenon to *irregular action of the retina*.

CASE 3.—Mrs. W., nearly 40 years of age, in an advanced stage of pregnancy, after stooping down for a short time to search for some small object on the floor, perceived a slight vertigo and a considerable confusion of her vision. On looking at any object, one half of it was totally obscured, the missing half being to the *right*. Both eyes were thus affected. This excited much alarm in her mind, fearing that it was but the fore-runner of something more serious. She had occasionally been subject to muscæ volitantes, and was obliged to wear convex glasses for reading or sewing, but there was no morbid appearance of either eye. I advised her to take a cup of strong tea, and to lie down for a short time. She did so, and, on rising about an hour afterwards, was pleased to find that this alarming phenomenon had vanished.

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## SECTION VIII.

### AMAUROTIC CAT'S-EYE.

In some rare cases of amaurosis, it happens that a peculiar shining appearance is observed in the bottom of the eye, which bears some resemblance to the luminous reflection seen in the eye of the cat, and hence the term amaurotic cat's-eye. This appearance, however, is not confined to cases of amaurosis. It probably arises from effusion of a yellowish matter into the texture of the retina, or of the choroid, and is most frequently witnessed after injury to the eye. There is no other peculiarity observable. It is important to be aware of the occasional existence of this

phenomenon ; and the more so, as it may lead to the supposition of the case being one of incipient fungus hæmatodes, which is also characterized by a brilliant shining appearance in the bottom of the eye. It is more than probable that cases of amaurotic cat's-eye have been thus mistaken, and extirpation of the globe performed under the impression that it was the subject of malignant disease ; and, on the other hand, instances of this affection have been reported as either cured, or having their progress arrested, which have been considered by the surgeon as genuine cases of incipient fungus.

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## SECTION IX.

## GLAUCOMA.

Another variety of amaurosis is that termed *glaucoma*, because, on looking into the pupil, the posterior chamber, instead of being perfectly transparent, exhibits an appearance of a dull-green colour. That these trifling deviations, depending upon accidental circumstances, should be thought worthy of distinct names, and indeed be described as distinct affections, is certainly not a little remarkable. In cases described as *glaucoma*, it has been ascertained by the investigations of Mackenzie, Rosas, and others, that the internal textures of the eye generally have been the seat of chronic inflammation, which has led to various diseased appearances, the retina being, in most instances, probably the focus of the morbid changes : thus, the retina has been found covered with a deposit of lymph, or otherwise altered in its structure ; the vitreous humour fluid, and of a yellowish or greenish tint ; the pigment of the choroid more or less absorbed, and its vessels varicose ; and, frequently, the crystalline slightly discoloured or opaque, with sundry other changes, characteristic of the previous existence of internal ophthalmia. The disease is, indeed, essentially the same as that which I before described as amaurosis from inflammation of the retina, and is sometimes observed as an acute, and at others as a chronic affection. The treatment is, of course, precisely the same as that of retinitis.

## SECTION X.

## MUSCÆ VOLITANTES.

I have before stated that certain illusory appearances, resembling flies or other dark objects in motion, are commonly observed in the progress of amaurosis. We are not, however, to imagine that, whenever a patient comes to us complaining of these *muscæ volitantes*, he is therefore necessarily about to be the subject of amaurosis, since such appearances are frequently observed by individuals whose eyes are otherwise faultless. The shapes which they assume are exceedingly various; in some persons resembling the head of a fly, or portions of soot, or animalculæ in great numbers; in others having the appearance of semi-transparent vesicles, or net-work. Sometimes these phenomena remain for a considerable time, when they are lost sight of, or, the attention of the individual being otherwise engaged, they cease to attract notice, but afterwards again become perceptible. They are seldom observed, I believe, by candle-light. Certain states of the weather appear to influence them, as they are usually more perceptible in very dull weather, but are by no means confined to it. I am inclined to think, however, that the state of the circulation, and the excited or depressed condition of the nervous system, have the most powerful influence in producing them. Hence, the appearances in question are more vividly discerned the morning after a debauch, or after a person has been deprived of a considerable portion of his natural sleep. Over-exertion of the eyes, and of the body generally, is also a means of exciting this peculiar condition; so that persons who read and write much are apt to be affected in this manner; and delicate females, and individuals who are poorly-fed and hard-worked, also frequently complain of these appearances. Venereal excesses, likewise, indirectly occasion this affection; so also, other depressing influences, which act by diminishing the energies of the nervous system.

*Muscæ volitantes* appear to be referrible to some disordered action of the vascular structure of the retina,—of course of a temporary character,—just as we see a flushed cheek and reddened conjunctiva after the excitement of wine and other stimuli. The throbbing of the vessels of the head, which is also frequently experienced after such attacks, is a further confirmation

of this view ; and I have known individuals in whom all these phenomena including muscæ volitantes, and even coloured rings, have constantly followed irregularities over night. It may be presumed, likewise, that the flashes and sparks of fire, sometimes complained of, are attributable to increased or irregular action of the vessels of the retina, which are temporarily enlarged, and that the augmented impulse of the blood through them may convey to the sensorium the idea of red light. Mr. Wardrop has stated his opinion that the various colours produced in the eye by the pressure of the finger, or by a stroke upon it, as mentioned by Sir Isaac Newton, originate in the derangement of the circulation of the blood through the vessels of the retina.

The fixed musca, or *scotoma*, as it is technically named, on the contrary, is probably owing to an actual paralysis of some portion of the retina, so that no image at that point is conveyed to the brain.

Appearances of this description very often alarm the subject of them, as he is apt to consider them the precursors of some more serious affection ; but, in cases in which vision is unimpaired, and no other symptoms of disease are present, we may generally assure the patient that there is nothing to fear. I have known instances in which persons have been subject to these appearances during many years, without any bad consequences resulting. It will not only be satisfactory to the patient, but it is highly important to the practitioner to be fully aware of this, because if, under the impression that amaurosis is about to come on, active depleting measures are had recourse to, we may in many cases, particularly in delicate persons, rather increase than diminish the tendency to that disease by such a proceeding.

*Treatment.*—Seeing, then, that muscæ volitantes are observed in persons of different constitutions and of opposite habits of life, it is clear that one uniform mode of treatment cannot properly be recommended. In persons who enjoy good health, and have no other ailment, it is perfectly unnecessary to interfere. Should the affection evidently originate in, or be apparently dependent upon, an enfeebled state of the constitution, it must be treated by such means as have a tendency to improve the general health of the patient, as nourishing diet, country air, and the administration of tonic medicines, when the appearances in question will probably be much diminished, if not actually removed. On the other hand, these phenomena are occasionally met with in robust, plethoric



persons, and in those who indulge freely ; and, in such, they will probably depend upon inordinate vascular excitement, and we may very properly recommend either general or local blood-letting, counter-irritation, occasional purgatives, and abstemious diet.

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## SECTION XI.

### INJURIES OF THE RETINA.

A blow upon the eye will sometimes produce so much injury as to paralyze the retina at once, and that without any particular mischief having been inflicted on any other portion of the organ. Some writers have attempted to show that the effect of injuries of this description will be in proportion to the presence or absence of resistance, or preparation on the part of the patient, at the time of the accident. Most injuries of this sort are accidental,—unexpected, and therefore no preparation can be made to ward off the means by which they are inflicted. If it be meant, generally, that a person who is expecting a blow, as in boxing, will be better prepared to ward it off, and that when an injury is received under such circumstances, the mischief inflicted on the eye will usually be less, so far may be readily granted ; but, if it be intended to mean that the same degree of violence applied to the eye when the person is not expecting it, will produce more serious effects than when he is on the look out for the injury, then I do not perceive that the proposition is tenable. Odd cases are cited in support of this view in which very slight injuries, received when the patient was not expecting any mischief, produced complete amaurosis ; but I am sure that numerous cases are constantly occurring, in which very considerable injury has been sustained, under similar circumstances, without any such result.

Loss of vision, after injury to the eye, may arise simply from the concussion which the nervous matter of the retina sustains, just as we see the function of the brain suddenly annihilated from the like cause. In other instances, there may be some lesion,—some slight rupture of the vascular tunic of the retina, producing a certain amount of hæmorrhage. If this be but trifling, vision will frequently be restored with proper attention ; but,

if it be more extensive, the chances are less favourable. The indications, in all cases of this description, are, to prevent inflammation, which is best effected by keeping the organ at rest, and free from every kind of excitement. Severe injuries of this character, particularly when attended with hæmorrhage, are very apt to be followed by absorption of the globe; and it is a common remark, that after the vision of one eye has been lost from accident, the other is very apt to become amaurotic, so that great caution is requisite under such circumstances. It is also remarked, that when an eye becomes permanently amaurotic, the optic nerve is found to be atrophied; but the eye-ball itself never becomes absorbed, except there has been general disease of its textures, or after severe injury.

Slight punctures of the retina, such as are made with the needle in operations for cataract, do not appear to produce any mischief; but still, in cases of depression, in which the lens is pushed below the axis of vision and in contact with the retina, the proceeding must be injurious in many instances, although in others no bad effect appears to result.

*Ossification*, and other morbid changes of the structure of the retina, are occasionally noticed; these, however, are rather pathological curiosities than instructive practical facts.

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## CHAPTER VII.

## DISEASES OF THE HUMOURS.

Of the three humours or lenses of the eye, the crystalline is not only the most important, but it is likewise the most frequently affected with disease, and may therefore fairly be regarded as entitled to a priority of notice.

## DISEASE OF THE CRYSTALLINE HUMOUR, OR CATARACT.

*Lentitis.—Capsulitis.*—I shall not enter upon a detailed account of lentitis and capsulitis, or inflammation of the crystalline lens and its capsule, because these conditions are merely the result of extension of inflammatory action of the iris, or of some of the internal textures of the globe.

Morbid changes of the crystalline humour, or of its capsule, however originating, are always followed by one very striking alteration in its appearance, viz., a loss of transparency, the technical name of which is cataract.

*Causes.*—Opacity of the crystalline, or cataract, is, no doubt, occasionally the result of increased action or inflammation. More commonly, however, it seems to depend on a diminution or loss of vitality, the vessels supplying the lens being weakened or impaired in their action, or, in some instances, they may be even cut off or ruptured, as may be supposed to be the case when cataract supervenes upon blows or other injuries inflicted on the eye. Doubtless, it is from diminished vitality that this morbid condition so frequently arises in elderly persons. A similar state of opacity is likewise frequently noticed around the margin of the cornea at a somewhat advanced period of life,—the condition to which I before

alluded as constituting the appearance termed *arcus senilis*, and which, according to Dr. Ammon, is always accompanied by a corresponding opacity of the circumference of the crystalline. It is very difficult to assign a cause which can satisfactorily account for this morbid condition in many cases, but there seems no reason to suppose that the causes of opacity of the crystalline can be different from those producing morbid changes elsewhere, since we find it following inflammation, injuries, and the like, as well as being hereditary and congenital. Whatever be the exciting cause, however, loss of transparency is an invariable result of disease of the crystalline; and as this condition must necessarily impair vision to a very considerable extent, it becomes a matter of great interest and importance both to the surgeon and patient.

The disturbance of vision which accompanies opacity of the crystalline is intended to be expressed by the term employed to designate it, viz., cataract, which is derived from the Greek, and signifies breaking down or disturbing, implying that sight is much impaired or destroyed by it. The amount of injury to vision will, of course, depend upon the intensity of the affection; for if the opacity be not very dense or very extensive, vision will be but slightly interfered with: indeed, we often perceive a decided opacity or coloration of the lens in elderly persons, without any material defect of sight.

Opacity is regarded by some writers as the original condition of the crystalline. I have myself witnessed this, in several instances, in the eye of the fœtus. In general, the opacity disappears as the period of birth approaches, the lens usually remaining transparent through the greater part of life, and again displaying a tendency to become opaque as old age advances. The period of life most obnoxious to it appears to be from sixty to seventy years of age, although occasionally observed at all ages.

An endless variety of names has been bestowed upon the varied appearances which the crystalline presents when affected with cataract, most of which, however, are of little or no practical utility. When the crystalline alone is thus affected, the disease is named *lenticular*,—when the capsule alone, *capsular*; and when both are involved in the morbid change *capsulo-lenticular cataract*. Some writers mention an opacity of the *aqua Morgagnii*, as constituting a species of cataract; but it is extremely doubtful if there be any foundation for such a view, because that fluid exists in so minute a quantity as scarcely to be appreciable; and, more-

over, if it were liable to become turbid, there can be little doubt that it, like the aqueous humour, would usually regain its transparency. The general and practical divisions of cataract are into the *hard*, *soft*, *accidental*, and *capsular* varieties; and, under these different heads, I trust to be able to relate every fact of importance bearing upon this interesting subject.

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## SECTION I.

### HARD CATARACT.

This variety of cataract is usually met with in elderly persons. The lens, indeed, in old age, generally becomes firmer, whether it be opaque or otherwise; it likewise diminishes in bulk, and loses much of its convexity. When cataract exists in elderly persons, the crystalline, instead of being perfectly transparent, and therefore invisible, is observed a little behind the pupil, of a yellowish or amber colour, and decidedly opaque. Such is, at least, the case when the crystalline alone, and more particularly its central portion, is the seat of this morbid change; but, in cases of capsulo-lenticular cataract, the opaque body appears to be actually in contact with the posterior surface of the iris, and, instead of being of a yellow or amber colour, is of a pearly white. The amount of vision in these two cases is ordinarily very different, for if the crystalline alone is opaque, the opacity is usually most dense in its centre, the outer laminae frequently retaining a certain amount of transparency, so that the rays of light pass through the pupil and circumference of the lens; and thus vision, although very imperfect, is seldom completely destroyed. If the capsule, also, have become opaque, then the opaque body, lying in immediate contact with the posterior surface of the iris, completely shuts out all the rays of light, and vision is almost annihilated, but little more than the power of distinguishing light from darkness remaining to the patient.

The amount of vision, then, will much depend on the circumstance of whether the lens alone be opaque, or the capsule also have become involved in the opacity. When the capsule is opaque, the lens will usually be so likewise; but this can only be ascertained after its removal, except the opacity was first noticed in the body of the lens, and was subsequently

observed to extend to the capsule. This, however, makes no difference in the treatment, because the opaque capsule cannot be removed without the previous removal or destruction of the lens.

When the crystalline alone is the seat of opacity, I have said that vision is much less affected than when the capsule is also opaque: this is more particularly the case if the opacity be confined, or nearly so, to the nucleus or central laminæ of the lens. But, in some instances, the opacity of the lens is so general as to prove a complete barrier to the passage of the rays of light; when this happens, the external laminæ usually present a whitish, glistening, and radiated appearance, and the dark yellow or amber colour, which is confined to the central laminæ, is not perceived through the white and streaked opacity of the external layers. This appearance of the outer laminæ often leads to the supposition that the lens is soft; but, I believe, the only inference that can properly be drawn from it relates to the seat of the opacity rather than to the consistency of the cataract. No doubt, the external are generally less dense than the central laminæ; and this may account for the difference of colour in each when affected with opacity.

Lenticular cataract, when it occurs at an advanced age, is often of very slow progress. Sometimes there is a central opacity, confined to a very small space, which remains stationary for many months, or even years, without materially impairing vision. In this event, the sight is improved by the use of convex spectacles; and, in most cases of incipient or imperfect cataract, vision is found to be better in a dull light, or on a cloudy day, because of the greater dilatation of the pupil which then obtains; for the same reason, the patient sees better when his back is turned to the window and he looks towards the shaded part of the room; so also after the application of belladonna. These circumstances usually form a sufficient criterion to distinguish between cataract and amaurosis; for, in the latter condition, the greater the amount of light and the better for vision; whereas, in cataract, as I have said, it is just the reverse.

As the opacity increases, the patient's vision becomes more impaired, the difficulty of discerning objects is augmented, every thing appears to be enveloped in a dense mist or fog, and he can only perceive at all distinctly such objects as are much illuminated, as a sheet of white paper, the flame of a candle, and the like. In some instances, indeed, there is little more than the ability to distinguish light from darkness remaining. This,

however, is but rarely the case when the function of the retina remains unaffected. In general, the patient can make out vivid colours, the form and situation of surrounding objects, and can perceive his fingers when held up before his eyes, and count them, although of course, indistinctly, and as if seen through a thick veil or cloud. This cloudy appearance of objects, in cases of cataract, is usually of a whitish or greyish colour; whilst, in amaurotic cases, it is generally black.

There can be but little difficulty in ascertaining the opaque condition of the crystalline, when it has arrived at such a degree as materially to impair vision. Instead of the intense black, which the pupil presents when the lens is transparent, we observe an opaque, yellowish, or pearl-coloured substance, in almost immediate contact with the iris, the fringed border of which forms a striking object; and, when the opacity does not affect the capsule, and the outer laminae of the crystalline retain a certain degree of transparency, there is a dark-coloured ring observed upon the opaque lens, which is caused by the shadow of the iris being thrown upon that body.

*Diagnosis.*—No one accustomed to the examination of the eye, when the subject of cataract, can mistake the opacity produced by disease or injury of the crystalline for other opaque appearances, which are sometimes noticed, such as in cases of glaucoma, fungus hæmatodes, and the like. Mistakes of this description are, however, sometimes made. In glaucoma the opacity is of a sea-green colour; it is seated much farther back in the posterior chamber, and usually bears no relation to the accompanying imperfection of vision. The opacity is also best seen when looking directly into the pupil, whereas if we look sideways it disappears, which is not the case in cataract. Other amaurotic symptoms are likewise usually present, such as muscæ, scintillations of light, coloured rings, and the like. In fungus hæmatodes the opacity is of a shining, metallic appearance, very different to the white or yellow-coloured opacity which the lens or capsule exhibits.

*Catoptric Experiment.*—In cases where there is a difficulty in diagnosis, (which there can only be when the opacity is very slight,) the following mode of examination has been recommended by Professor Purkinje, of Breslaw. It must first be stated that if a lighted candle be held before the pupil of a healthy eye, three reflected images of it are seen situated one behind the other. Of these, the anterior and posterior are

*erect*, the middle one *inverted*. The anterior, which is the brightest and most distinct, is produced by the cornea. The posterior is very indistinct, and is produced by the anterior surface of the lens. The middle, or inverted one, is the smallest, and is produced by the posterior surface of the lens. Of course, then, if the opacity be posterior to the lens, all these reflected images of the candle will be distinctly seen, and the more so from the opaque background. We therefore conclude that when these images are all present, the opacity will probably be in the vitreous humour, or some portion of the posterior chamber, as in glaucoma. If the crystalline lens be opaque, then only the anterior image,—the one produced by the cornea,—will be visible, and the same if the anterior hemisphere of the capsule be opaque; but if the centre or posterior part only be opaque, then the two erect images are seen, but the inverted one is wanting. In glaucoma, however, the posterior part of the lens frequently becomes somewhat opaque, and then the inverted image is indistinct. Dr. Mackenzie states that if the candle be held opposite the pupil, there is often a difficulty in distinguishing between incipient cataract and incipient glaucoma, the inverted image being indistinct in both diseases; but when the candle is moved to one side, it becomes distinct in glaucoma, and remains obscure in cataract.

Pure cataract is rarely attended with, or preceded by, much local suffering or constitutional disturbance, as is commonly the case with amaurosis, such as vertigo, head-ache, chronic and deep-seated ophthalmia, and the like. The motions of the iris are also usually quite perfect, the pupil contracting and dilating with the varying intensity of the light; and, if these motions are not observable, or are only imperfectly and sluggishly performed, we may fairly suspect the existence of amaurosis, or other affection of the internal textures; but, as an active condition of the iris is sometimes witnessed in amaurotic eyes, we must not depend simply upon this as a criterion of the healthy state of the retina, but also take into consideration the actual amount of vision, as well as the general appearance of the organ. Operations for cataract are often performed upon the eyes of individuals whose pupils are active, and who possess a general sensibility to light, without any benefit resulting, because of the insensible condition of the retina, which is apt to be overlooked, on account of the surgeon adhering too closely to the somewhat fallacious axiom, that an active pupil is the index of a healthy condition of the retina.



Cataract is occasionally confined to one eye; but this is more frequently the case in young and middle-aged persons. In elderly people, it not unfrequently happens that one is very considerably affected, and the other but slightly; and this may be the case for some time, but, sooner or later, vision generally becomes obscured in both.

*Medical Treatment.*—The medical treatment of cataract is very unsatisfactory. Some practitioners, regarding the disease as commonly the result of inflammatory action, have recommended blood-letting, mercury, and general antiphlogistic remedies; whilst others have thought that counter-irritation, by caustic issues, and powerful stimulating applications to the orbital region, as ammonia, galvanism, and electricity, might prove useful in exciting the action of the absorbents, so as to remove the opaque matter supposed to be deposited into the texture of the lens, and to render it again transparent. Opacity of the lens, however, seems rather to consist of an entire change of its organization than an opaque deposit into its texture; and therefore no analogy exists between this species of opacity and that resulting from inflammation. I do not believe that a case of restoration of the transparency of an opaque lens has ever yet been witnessed, so that any expectation of benefit to result from the treatment of which I have spoken is not likely to be realized. The only remedy with which we are at present acquainted is the removal of the opaque body from the axis of vision, a proceeding which can only be accomplished by a surgical operation.

In cases of hard cataract, this may be effected either by extracting it from the eye, through an opening into the circumference of the cornea, or by depressing it into the vitreous humour.

#### EXTRACTION OF CATARACT.

In performing the operation for extraction, the object of the surgeon is to remove the opaque crystalline from the eye at once. This operation, when practicable, is to be preferred in elderly persons, because in them, as I have previously stated, the cataracts are almost always hard; and if left to undergo the process of absorption, as in the other modes of operating, would take a very long time for their removal, and probably be a source of constant irritation within the eye, so as to excite internal inflammation, resulting in closed pupil, or even amaurosis. It is, therefore, generally admitted by those who have had competent means of forming an

opinion, that extraction is the operation best suited to the case of hard cataract. We need, therefore, have no hesitation in recommending this operation in such a case, except there be some formidable impediment in the way, as a sunken condition of the eye, a very convex state of the iris, so as materially to diminish the size of the anterior chamber, or a remarkable degree of unsteadiness and timidity on the part of the patient. Extraction, however, is not to be entered upon rashly, and without due caution and preparation on the part of the operator. There is, probably, no operation in the whole range of surgery that requires a greater amount of coolness, dexterity, and easy manipulation. "The operation of extraction through the cornea (says Dr. Mackenzie) is too artificial a piece of surgery to be trusted to the hands of those who have not made themselves masters of the subject, and already shown a certain share of natural or acquired dexterity in operating on the eye. It is too nice and dangerous an operation to be undertaken without the utmost precaution, composure, and steadiness." Manual dexterity is far from being the highest qualification of a surgeon; it is, however, of so much importance in extraction, that he who does not possess a moderate share of it would do well to abstain from the attempt.

*Health of the Patient and Preparatory Treatment.*—Previously to the performance of an operation for cataract, and especially that of extraction, it is of great importance to ascertain if the patient be in a fit condition to encounter it. If he be out of health, of too plethoric a habit, or the system be unduly depressed, or the subject of bronchial or rheumatic affection, these conditions, or any of them, should first of all be remedied. Generally speaking, due attention to the state of the alimentary canal, a rather abstemious diet for some time previous, and, in plethoric persons, venesection, a day or two before the operation, are the important points to attend to. It would, of course, be highly improper to operate whilst any tracheal or pulmonary irritation exists, as the coughing must be exceedingly injurious to the eye afterwards, tending to force open the wound of the cornea, and to excite and injure the organ materially. So with rheumatism, there would be danger of the morbid action extending to the fibrous and muscular tissues of the eye. Any affection of the palpebræ, chronic ophthalmia, or any other disease of the eye, or its appendages, should also be first remedied, and any other source of irritation elsewhere removed, if practicable.

*Old Age.*—Some surgeons consider that extreme old age is an unfavourable period of life for after recovery; they imagine that the reparative powers would be insufficient, and that there would be an uncontrollable tendency to ulceration, or sloughing of the cornea, after the section of so large a portion as is necessary for the removal of a cataract. My own experience is against that view; I have generally found that in very old persons there is less liability to inflammation, and that when the healing process is retarded, it is in consequence of a more or less severe attack of that morbid action. I have performed this operation on a person very nearly *ninety years* of age, with the most perfect success; vision having been completely restored in both eyes, and without inflammation having come on, the incisions having healed so perfectly as to be scarcely traceable in a few weeks afterwards. The late Sir Wm. Blizard also had the operation of extraction performed upon him, by Mr. Lawrence, on one eye, at about the same age, and with, I believe, perfect success. Other surgeons have stated that when there is *arcus senilis*, the operation for extraction ought not to be performed, inasmuch as it indicates a feebleness of action in the vascular economy of the eye, which would probably prevent the union of a wound inflicted on the cornea in that condition. I have several times incised the cornea, when thus affected, with as great success as where no such affection existed.

*Season for Operating.*—Some writers insist that an operation for extraction of cataract ought not to be undertaken during the winter season. I confess that I see nothing in the objection. If the patient be in good health at the time, I should say that there is nothing adverse in the season of winter. A more reasonable objection might be urged against the great heat and bright sun-light of summer, which are more difficult to guard against than the cold of winter. My own experience leads me to conclude that the operation is at least as successful in winter as in summer. In this country, where usually the winters are mild and the seasons temperate, the periods are few and of short continuance in which the operation would be improper. Of the two, I should certainly more strongly object to the summer, but I should also decline operating in a very frosty season.

*Operation on one or both Eyes.*—It is a question with some surgeons, too, whether, when both eyes are the subject of cataract, the operation should be attempted on more than one at a time; others, again, maintain-

ing that it is best to operate on both at once. In the event of the patient having the operation performed on one eye only, if that be successful, he is satisfied, and will but rarely submit to a second operation ; if it be unsuccessful, he will likewise frequently refuse to submit to any further operative proceedings, or if he do, he will generally select another operator. If, on the other hand, the operation be performed on both eyes at the same time, and one only succeed, the patient is perfectly satisfied ; and I think he is better off than when he has only had the operation on one eye, with a little vision remaining in the other. In the latter event, I have known patients complain of the cataractous eye interfering considerably with the vision of the other. The principal advantage of operating on both eyes at once is the saving to the patient of a great amount of confinement, anxiety, and suffering, in contrast to what he would have to undergo if the operations were to be performed at separate times ; and a person who regains the use of both eyes is in a much better position than he who has only one, valuable as one alone often is. For these reasons I am inclined generally to prefer the operation on both eyes at one sitting. Some surgeons think, however, that, in the event of a severe attack of inflammation, there is greater danger when both eyes have been subjected to the operation, than when it has been confined to one ; but it generally happens that when both eyes are thus affected, one is much worse than the other ; and I think it must be a rare occurrence for both to be lost, simply from the inflammation that ensues, when the case has been properly attended to, and nothing unusual has happened during the performance of the operation. That such untoward cases do sometimes occur is, however, quite certain. Of course, it must be admitted that if the operation has been performed on both eyes and has failed in both, nothing more can be done, that is, if the inflammatory action has been of such a character as to destroy both ; whereas, if only one has been unsuccessfully operated upon for extraction, then some other operation, such as depression, or division of the lens, may be attempted afterwards.

*Cataract of one Eye.*—When one eye only is the subject of cataract, it is generally unnecessary to interfere, particularly in old people ; vision cannot be said to be lost, when only one is thus affected : and nothing less than a very serious impairment, if not an almost total loss of vision, can justify an operation of this importance. When one eye has been previously lost, from any other disease, and particularly from amaurosis, and

the other is the subject of cataract, we should be in no haste to operate upon the latter, and always enter upon an operation in such circumstances with hesitation and apprehension as to the result. It may, indeed, be questionable if it will in any case be proper to attempt the operation of extraction after one eye has been lost, either from disease, accident, or a previously unsuccessful operation.

*Position of the Patient.*—Having decided as to the propriety of attempting the operation for extraction, the next question is, as to the proper position for the patient. Some surgeons prefer that the patient be placed horizontally on a bed, table, or sofa: in this position, the operator usually places himself behind the patient on a stool, at a proper elevation, and secures the upper eye-lid, whilst an assistant depresses the lower one in front. Others choose to have the patient sitting in a suitable chair; then the operator seats himself before the patient, and takes charge of the lower lid; and the assistant standing behind elevates and fixes the upper lid, and makes gentle pressure on the globe, so as to steady it. Neither of these positions will be at all times convenient. I am inclined generally to prefer the former, because in the horizontal position the patient is steadier, he is more under the control of the surgeon, and the management of the upper eye-lid, and the proper amount of pressure on the globe, can all be regulated with more exactness by the operator himself than by another. The principal objection is, that the eye, in irritable individuals, is very apt to roll upwards under the superior lid, particularly when it is much sunken, and does not admit of being fixed by the fingers of the surgeon; in this event, there is a difficulty in completing the section when attempted upwards.

*Instruments.*—The instruments necessary to be provided with for the operation of extraction (and which are found in all the instrument cases), are the cornea or extraction-knife, and a curette with a scoop at the other extremity of the handle. Others are sometimes required to enlarge the wound of the cornea, when not made sufficiently ample at first; such as a convex-bladed knife, or a very fine pair of scissors, which should always be close at hand.

*Beer's Knife.*—The cornea-knife is the principal instrument, and that introduced by Beer is the one now in general use; it is, as is well known, of a somewhat triangular shape, and seems much superior to any previously employed. I have thought, however, that it might be improved

upon. The great difficulty in the operation for extraction is in making the incision around the margin of the cornea of a sufficient extent. It but rarely happens, indeed, that the operator can make this of the size which he has previously determined upon, and hence the necessity of instruments to enlarge the wound of the cornea.

*Double-edged Extraction Knife.*—It occurred to me that this difficulty might be diminished by the employment of an instrument having a cutting edge on both sides, each side forming an equal angle, and of a spear-shape. This instrument, it will be perceived, whilst traversing the anterior chamber, and cutting around the upper margin of the cornea, will likewise, to a certain extent, cut around its lower margin, and thus make a larger opening than can readily be effected by the use of Beer's knife. It is curious that an instrument of similar shape was employed by Daviel (who first performed the operation of extraction) in the first stage of the proceedings. His instrument, however, was very small, scarcely larger, I imagine, than a packing-needle,—*une aiguille pointue, tranchante, et demie-courbée, ayant la forme d'une lancette, destinée pour faire la première ouverture*,—and was merely used, as will be seen, for the purpose of puncturing the cornea, others being afterwards employed for enlarging the opening.

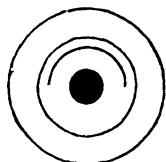
Instruments having a cutting edge on the back, to a greater or less extent, have been used by various operators. Wenzel's knife, at the upper edge, "to the extent of one-eighth of an inch from the point, is keen like the lower edge, in order to facilitate the conveyance of the instrument through the cornea." Mr. Cleobury, of Oxford, speaks of having occasionally used a knife with "a cutting edge below, and at its back, for half the length of the blade; this knife, by cutting upwards as well as downwards, makes, what is so very desirable, a large opening in the cornea for the ready escape of the lens." Professor Rosas is also in the habit of using Beer's knife, with a cutting edge on both sides. Mr. Middlemore has likewise used an instrument resembling the one I have described, for the purpose of removing staphylomatous projections from the cornea. A similar instrument is also figured in Weller's Manual, by the late Dr. Montearth. It is there stated to be "particularly used for the opening of the lachrymal sac, of hypopion, of abscess of the cornea, as also for the puncture of the cornea in forming an artificial pupil, according to the method of Reisinger." The very fact of such an instrument having been

used for purposes of a similar character, and other instruments approximating to this in so many respects having likewise been used for the purpose of extraction is, I conceive, a strong recommendation in its favour. After all, however, as some writers allege, it may be perhaps more the operator than the instrument that is in fault; but I think I have succeeded better in making a good section of the cornea with the instrument I have described than with that of Beer. Indeed, since I have employed it, which I have now invariably done for several years, I have never had occasion to use any instrument to enlarge the wound made by it.

*Artificial Dilatation of the Pupil.*—Some operators think that the dilatation of the pupil, previously to the performance of this operation, is of importance. I frequently try it, but see no particular advantage in this; on the other hand, I sometimes think the point of the knife is apt to catch against the pupillary margin of the iris, after the belladonna has freely acted, and that, therefore, there is greater danger of injuring that structure than when the pupil is contracted. The advantage, if there be any, is that there *appears* to the operator to be less danger of wounding the iris when the pupil is dilated, and he is perhaps on that account less likely to wound it, inasmuch as he proceeds with greater confidence, and therefore with more steadiness. It is probably, however, a matter of little moment whether the pupil be contracted or dilated previously to the operation, for if it be dilated it contracts immediately that the cornea is punctured and before the knife can traverse the anterior chamber.

*Operation.*—The patient being extended on a sofa, we will suppose the head raised to a convenient height by pillows, and the right eye the one to be first operated upon; the surgeon, taking his seat behind, raises the superior eye-lid with the fore and middle fingers of his left hand, and steadily presses it against the superciliary ridge, at the same time fixing the globe so as to prevent its moving away; the cornea-knife being held in the right hand, between the thumb and two fingers, in the manner of a pen, is made to penetrate the anterior chamber by puncturing the cornea at its temporal margin; the instrument is then pushed on to the corresponding point of its nasal margin, and, so soon as the counter-puncturation is effected, is made to cut directly upwards, a proceeding which usually divides about one-half of the cornea, and of course, lays open the anterior chamber to a similar extent; this should be effected with as little loss of time as practicable, because the aqueous humour immediately escapes, the

iris falls forward, and the knife is apt to get entangled within it, and some mischief may ensue; but, even in this event, it is best to push on, and complete the section of the cornea, although the iris may be injured by so doing, since more damage is sure ultimately to follow the withdrawal of the knife, and the employment of other instruments to enlarge the wound, than can possibly result from cutting the iris: care should be taken that



the incision in the cornea should be at a little distance from the line of junction with the sclerotica, (as indicated by the semi-circular line in the diagram,) so as to diminish the chance of the escape of a portion of the iris through the wound, although, if it be too far removed, there will be an equal

danger that the aperture will be too small to allow of the escape of the cataract.

*Mode of Introducing the Knife.*—Inexperienced operators sometimes introduce the point of the knife in such a manner as, instead of perforating the anterior chamber, merely to pass it between the laminae of the cornea. To obviate this occurrence, we are usually advised to direct the knife, in the first instance, as if we were about to carry it into the pupil; and then, so soon as the punctation is effected, to pass it transversely across the anterior chamber. It is well for the young surgeon to keep this in view; but he who is accustomed to the performance of this operation may safely disregard the recommendation.

*Use of the Curette.*—The requisite incision into the cornea having been effected, the most important part of the operation is completed. On the removal of the knife all pressure on the eye must instantly cease, and the lids be allowed gently to approximate. The proper completion of this part of the operation is always a source of the highest gratification to the surgeon, as he knows but little difficulty can occur in the after stages, when the aperture in the cornea is sufficiently ample for the easy transit of the lens. A few minutes' rest having been allowed to the patient, the lids must be again gently separated, when the curette is to be passed beneath the flap of the cornea into the pupil, and the capsule gently lacerated by it, so as to facilitate the egress of the lens; the instrument being withdrawn, and another short pause given, the eye-lids are again separated, and gentle pressure made upon the globe with the end of the



scoop, when the lens is usually perceived protruding through the pupil and out of the wound of the cornea, and the operation is ended.

When the different stages of this operation are passed through with the regularity and order which I have indicated, nothing can be more agreeable and satisfactory to the operator, and the bystanders wonder where the talked-of difficulty in its performance lies. Various deviations, however, are not unfrequently witnessed, which either complicate the proceedings, or render uncertain the result of the operation.

*Incision too small.*—Sometimes there is considerable difficulty, after the incision of the cornea has been effected, in causing the expulsion of the lens; this will, in most instances, be owing to the insufficient extent of the incision, when it becomes necessary to enlarge the wound, which is most easily effected with a pair of small, angular-shaped scissors. Various other instruments, as before stated, are employed for the like purpose. Jäger's knife seems also well adapted for this end; it consists of a common extraction-knife, covered with a silver shield: after having been introduced between the cornea and the iris, the shield being withdrawn, the knife is exposed, and a further incision is made in the margin of the cornea. It is always advisable, when practicable, to avoid having recourse to these additional instruments, since the chance of success commonly depends upon the greater or less amount of injury inflicted upon the organ during the operation; sometimes, when the incision appears to have been sufficiently ample, failure will occur from the lens rather receding into the vitreous humour than advancing through the pupil, when pressure is made upon the globe, probably from want of firmness in the vitreous body, and occasionally, perhaps, from strong action of the sphincter of the iris. In such a case, the introduction of an iris-hook, so as to transfix the lens and withdraw it through the pupil and wound of the cornea, is sometimes practicable.

*Rapid Escape of the Lens, &c.*—On the other hand, it now and then happens that the lens flies out immediately on the completion of the section of the cornea. This, which, to the inexperienced, might appear a fortunate and favourable circumstance, is often found in the sequel just the reverse, because it implies a certain amount of disorganization of the crystalline and vitreous humours and their capsules; for, in the healthy state, there is a considerable degree of adhesion between the two bodies which prevents the displacement of the lens, without a previous laceration

of the capsule and a subsequent attempt at expulsion of the lens itself from its natural situation : the case is still worse, if, in addition to the immediate escape of the lens, a large quantity of the vitreous humour should also be discharged, and this be followed by a considerable collapse of the tunics of the eye. If hæmorrhage from the interior of the globe should come on afterwards, the case may be regarded as absolutely hopeless. These untoward events, though not necessarily fatal to the success of the operation, except the last, are usually considered to render it a matter of uncertainty.

More commonly, the vitreous humour does not escape in any great quantity until attempts at the expulsion of the lens are made by the introduction of the curette and the employment of pressure on the globe. When it escapes in this manner, it is, perhaps, of less importance than when it occurs immediately after the incision of the cornea, and accompanying the lens itself. Disorganization of the humours, though sometimes indicated by a soft, boggy feel of the eye, is not always ascertainable prior to the performance of an operation, or otherwise it would be an insuperable objection to that of extraction.

In some rare cases, the difficulties of the operation appear to be absolutely insurmountable, the vitreous humour escaping in great quantities, the lens receding, the tunics collapsing to an extreme degree, the patient highly irritable, and the motions of the organ perfectly uncontrollable. In these circumstances, which, however, rarely happen, except when the incision has been too small, the continuance of the attempt to remove the lens is sometimes inadvisable ; and there is still a chance that the wound of the cornea may heal favourably, the vitreous humour be regenerated, the displaced lens ultimately become absorbed, and some degree of vision restored.

*Protrusion of the Iris.*—If there be any protrusion of the iris after the completion of the operation, gentle friction upon the eye through the lid, or a strong light directed upon the organ, will usually cause it to recede. If the same accident occur some time after the operation, it can only be treated on the general principle before laid down, when speaking of wounds and ulcers of the cornea.

*After Treatment.*—After the operation of extraction, it is essential that the organ be kept as nearly as possible in a state of absolute repose for several days, or until the wound of the cornea is healed, and any sub-

sequent inflammation removed. For this purpose, the patient should be confined to his bed-room, and principally in bed, for the first week or ten days. His apartment should be kept cool, light excluded, and the horizontal position maintained, except that the head and shoulders should be elevated. After the first day or two, he may sit up in bed occasionally. If both eyes have been operated upon, he should be enjoined to lie altogether on his back; if only one, he may occasionally turn on to the opposite side, but should be cautioned against lying on the affected side. It is a good plan to give him a moderate dose of opium, say 20 to 40 drops of laudanum, soon after the operation, and to repeat it at bed time for several nights and even occasionally during the day, so as to keep him in a quiet, dreamy state. If opium disagree with the patient, then some other sedative must be substituted, such as hyoscyamus, conium, or the preparations of morphine. His food should be restricted to a spoon diet, as bread and milk, weak tea or coffee, thin arrow-root and the like. His mind and body should be kept free from excitement, such as that produced by visitors, talking, &c. The best dressing for the eye consists of two or three slender strips of fine tissue plaster, which are to be placed gently over the closed eye-lids and ought to be sufficiently long to extend from the eye-brow to the upper part of the cheek, and which may be placed either crucially or parallel to each other, the skin of the eye-lids and around the orbit being previously moistened with cold water. By this means, the winking motions of the eye-lids are entirely prevented and the eye-ball is kept perfectly quiescent. The dressing should not be removed, except there be something peculiar in the case, until the expiration of three or four days after the operation, so as to favour union by the first intention; but if the patient complain much of irritation in the organ, it may be necessary to examine it at an earlier period: this, whenever done, should be effected with the greatest possible gentleness, so as to avoid irritating the eye. When the plasters are about to be removed, they should be previously well moistened with a sponge and warm water, when the eye-lids may likewise be gently laved and any hardened secretion from the ciliary margins cautiously removed. This kind of dressing may be properly continued for the first six or seven days if no active inflammation come on. Some practitioners merely apply a wet rag upon the eye-lids, which is secured by a light bandage passed around the head and face. Mr. Lawrence prefers the latter dressing, and probably it will answer very

well in general. What he can mean, however, by the following statement I cannot at all understand. "Nothing (says he) can be more objectionable than the method recommended by Beer, and followed by many German operators, of closing the lids by strips of sticking-plaster carried from the forehead to the cheek." What ill effects are to be expected we are not informed; and the objection is probably more speculative than the result of personal experience.

If active inflammation come on after the operation, it must be combated by vigorous antiphlogistic treatment, including general and local blood-letting, low diet, the use of evaporating and sedative lotions to the organ, and the like, modified according to peculiarities of age, sex, constitution, and other circumstances. The most unfavourable cases, and such as are the least amenable to treatment, are those in which suppurative inflammation comes on, or in which there is an uncontrollable tendency to extensive ulceration or sloughing of the cornea.

If there be no appearance of inflammation, there will be but little occasion for medicine. A brisk purgative should be given the day before, and then its repetition will not be needed until three or four days after the performance of the operation. For the first two or three days, indeed, it is better that the patient should be cautioned against any straining efforts. As all irritation about the eyes subsides, the patient may be gradually inured to the light, but great caution against any sudden exposure should always be taken. It is necessary to protect the eyes for some time after the operation by means of a shade, and much care will be required for several weeks, so as to guard against exposure to cold. The period of recovery, will be found to differ much in different individuals, much depending on peculiarities of constitution, season, and other circumstances.

I will now, in concluding the subject of extraction, relate a few cases by way of illustration, which will afford the inexperienced practitioner some idea of the variable success he may expect to meet with in the performance of the operation.

CASE 1.—Mrs. H., in the 88th year of her age, had been blind for a period of eight years. On examining her eyes, nothing unusual was discovered, with the exception of a white, diffused, pearl-like opacity, immediately posterior to the pupils, which were perfectly active, the case being evidently one of capsulo-lenticular cataract. On being informed that there was a probability of a restoration of sight by an operation, she was very desirous that it should be performed. It

seemed doubtful if this was a suitable case for extraction, considering the advanced age of the patient, the existence of a broad arcus senilis, a somewhat flat cornea, and a rather sunken eye. Uncertain as to what operation I should attempt, I ordered the belladonna to be applied over night, which had the effect of producing a full dilatation of the pupils. As she appeared very steady and unconcerned, I decided upon extraction. The patient being placed on a sofa, opposite the window, her head raised with pillows to a convenient height, I seated myself behind her. Securing the upper lid with my left hand, and having the extraction-knife in my right, I proceeded to make a section of the margin of the cornea in its upper half, which was accomplished in the usual manner and without any difficulty, the patient being perfectly composed, and the eye remaining steadily fixed. After two or three minutes' pause, the curette was introduced through the pupil, which was now perfectly contracted, and the capsule slightly lacerated. Another short pause, and the scoop was gently pressed upon the eyeball, when the lens, which was of a deep amber colour, immediately started out through the pupil and wound of the cornea. The lids were then secured with strips of adhesive plaster. Finding that the patient had been so remarkably steady, not having made a single exclamation or complaint, I proceeded to the repetition of the operation on the other eye, with no other difference than securing the upper lid with the right hand, and making the section of the cornea with the left. Not a drop of vitreous humour escaped from either eye, and no difficulty occurred in any part of the proceedings. She recovered remarkably well, scarcely any inflammation having succeeded. In the left eye, a prolapsus of the iris appeared, which, after a few days, was touched with the nitrate of silver, and finally subsided, the pupil being drawn slightly upwards. It was impossible to confine her to bed more than four days, and at the expiration of about a fortnight, she was able to use her eyes, and found her vision very completely restored. She lived seven years after the performance of the operation, (December 1838,) and her sight was such that, with the aid of convex glasses, she could read the smallest newspaper type with the utmost facility.

CASE 2.—Thomas O., aged 60, was admitted a patient of the hospital, November 8, 1842, on account of the defective condition of his sight. He stated that both eyes began to fail, in a slight degree, six or seven years ago, but more especially within the last eighteen months, from which latter period they have continued to get gradually worse. At the time of admission he was unable to read or follow his employment—that of a smith. His occupation had exposed him much to the action of large fires. When he looked at any object he could imperfectly discern it, but could not distinguish colours. At a few yards distant, every object was obscured by an apparently dense atmosphere of smoke. On looking at the flame of a candle it appeared as a circle of light, of a blueish colour, with a light red tinge around the edge, the diameter appearing to be about eight inches. If he looked at the full moon, there was an appearance of seven or eight different moons, without any change of colour. The sun presented a similar appearance

as did other luminous bodies at a distance. Vision was usually more distinct in a dull light, as the twilight. He had never felt pain, or had any inflammation of the eyes, or any head-ache, but had occasionally experienced slight vertigo. His general health was very good; he was rather corpulent in appearance, but very temperate in his habits, and of a pacific disposition.

The eyes presented a generally healthy aspect, but the *arcus senilis* was observed around the margin of the cornea, particularly at its upper portion; the anterior chamber was tolerably spacious; the iris healthy, of a blue colour, and the pupil very active. The crystalline lens was of a dark amber colour, the centre more especially opaque, the outer laminae retaining a certain amount of transparency, and the capsule perfectly transparent. There was no perceptible difference in either eye. A solution of extract of belladonna, as a collyrium, and a mild purgative pill were prescribed, and as he could manage to find his way about, he was advised to wait some time, and attend occasionally for examination.

January 10th, 1843. Nothing particular had occurred until this date, when the right eye was found to be suffering under a slight attack of iritis, which the patient attributed to exposure to wet. The pupil was much contracted, and of a cloudy appearance, the surface of the iris rather dim and discoloured, and there was some congestion of the sclerotic vessels; vision was also much worse in this eye. A blister was ordered to the right temple, and to be kept discharging with the cantharides ointment; ten grains of blue pill to be taken night and morning; and the continued use of the solution of extract of belladonna to the eye. A fortnight after this treatment had been prescribed, the right eye had returned to the condition it was in previously to the attack of iritis, vision not being materially worse than before.

March 24th. The patient had experienced no irritation in either eye since last report, but the vision of both had much diminished. He was very desirous that something should now be done with a view to the improvement of sight. I accordingly determined to admit him as an in-patient, and to perform the necessary operation.

April 1st. He was admitted into the house on the 28th ult., since when he had been cupped at the nape of the neck, had taken several doses of purgative medicine, and been restricted to a spare diet. Some extract of belladonna had been applied to the eyes, and the pupils were consequently well dilated. Having been removed to the operating room, he was placed on a sofa with the head somewhat elevated. I seated myself at the head of the patient, so as to command the upper eye-lids, the operation determined on being that of extraction through the upper margin of the cornea. The left eye was the first selected, the double-edged cataract-knife being passed rapidly through the anterior chamber, and made to cut out directly upwards, so as to make an opening just round the superior border of the cornea. No sooner was the incision completed, which was instantaneously effected, than the opaque crystalline escaped, and that without any pressure or *any attempt to puncture the capsule having been made.* A rather free discharge

of vitreous humour accompanied the escape of the cataract. Strips of adhesive plaster were then applied to the eye-lids before proceeding to the operation on the other eye. The same operation was then performed on the right eye with precisely the same result, the lens immediately following the knife, and there being a still freer discharge of vitreous humour. Plaster strips were then applied to the eye-lids. A draught, containing forty drops of laudanum, was given immediately, and another with thirty drops ordered to be repeated at bed time. He was afterwards carefully removed to bed.

2nd. Had slept well during the night, not having experienced much pain, The external appearance of the eyes was favourable, and the dressings were there fore not removed. The anodyne was ordered to be repeated at bed time.

3rd. The plasters were this morning removed; the conjunctiva of both eyes was very vascular, but the cornea perfectly clear; the patient had a very vivid perception of light and not much pain, but the eyes were very watery. The draught was ordered to be repeated at night.

4th. Much the same as yesterday, and could distinguish surrounding objects with both eyes. Plaster dressings were re-applied, and a purgative prescribed.

7th. He complained of some irritation on exposure to light, but of very little pain: the conjunctiva continued very vascular, but the cornea was perfectly transparent in each eye. The plasters were ordered to be discontinued, and instead to apply a thin fold of linen, dipped in warm water, to the surface of the palpebræ; a purgative pill to be taken occasionally.

13th. Considerable irritation was still experienced in both eyes, the conjunctiva continuing very vascular, but the cornea quite clear. On closely examining the eyes, the wound of the cornea of the left appeared quite smooth and completely cicatrized, whilst that of the right was somewhat irregular and appeared to be healing by granulation. Vision was improving, and he could bear exposure to light rather better; his general health was not much impaired, and the bowels had been kept free. A blister was ordered to the nape of the neck, to be kept open for a few days, and the warm water bath to be used frequently to the eyes.

22nd. The vascularity was now materially diminished; the lachrymation, intolerance of light, and other symptoms of irritation abated; vision improved; and, on the whole, the patient considered to be proceeding very favourably.

May 2nd. The eyes had now so far recovered that it was not deemed necessary to detain him any longer in the house; he accordingly returned home, having regained excellent vision, and being able, with optical aid, to read with facility.

The details of this case clearly prove that the expulsion of the lens immediately after the completion of the incision, even when accompanied by a rather copious discharge of vitreous humour, is not necessarily followed by any unpleasant result since the patient recovered, on the whole, very favourably.

CASE 3.—M. L., æt. 78, had lost the sight of both eyes for a period of twelve months. The lens in both was evidently opaque, of a whitish colour, and radi-

ated appearance; the irides active, and the eyes generally healthy, with the exception of the arcus senilis. She was admitted into the hospital a few days prior to the period fixed for operation, during which time mild aperient medicine was occasionally administered, and her diet regulated. The operation decided on was extraction. She was placed on a sofa in the usual manner. Seated behind the patient, I commenced with the right eye: the orbits projecting considerably, it was difficult to fix the superior lid, or to make sufficient pressure on the globe to steady it; the patient was also exceedingly irritable, and very much in dread. Attempting to push the cornea-knife across the anterior chamber, scarcely was the punctation effected than the eye rolled upwards under the superior lid. Having in some measure returned it towards the centre of the orbit and without removing the knife, I succeeded in reaching the opposite margin of the cornea, but, as anticipated, at too high a point to effect a sufficient aperture for the escape of the lens. After a pause, however, the curette was passed through the pupil, and the capsule gently lacerated; but on making pressure with the scoop, the escape of a considerable portion of the vitreous humour showed clearly that the discharge of the lens could not be effected. The incision in the cornea was then enlarged downwards and outwards, with a small pair of scissors, to the extent of about three lines. The eye-ball was now so flaccid that pressure seemed unlikely to cause the escape of the lens, and a small iris-hook was next introduced through the pupil, and the cataract transixed and brought out, and the operation completed. The lids were then secured with strips of court-plaster. Having succeeded thus indifferently with the upper section of the cornea in the right eye, and with the use of the right hand, I considered that I should not be justified in attempting the same process on the other eye with the left hand: I therefore determined on making the lower section in this eye. Seating myself in front, the patient retaining her position on the sofa, I proceeded to the operation on the left eye. The tendency of the eye to roll upwards was now, to a certain extent, counteracted by the knife commanding it in cutting out in the opposite direction. The incision was effected without difficulty; it was sufficiently ample, as proved by the ready escape of the lens, on slight pressure being employed after laceration of the capsule. The lower and outer border of the pupillary margin of the iris, (the pupil having been dilated by belladonna,) was caught by the point of the knife, in traversing the anterior chamber, and a small portion of it partially separated, which was afterwards snipped off with scissors as it hung out of the wound. The success of this case was partial. The eye last operated on perfectly recovered, the pupil being somewhat irregular, but vision as good as ever it is after cataract; the other was the subject of severe inflammation, which continued for several months, leaving a dense opacity on the outside of the cornea, corresponding with the line of the incision, particularly that portion which had been effected by the scissors; the pupil, also, remained nearly closed, and there was but a very small amount of vision.

CASE 4.—Mrs. H., aged 74, consulted me on the 14th of April. 1842. Her vision



was at that time so much impaired that she was obliged to be led about, and she was unable to discern any thing but a strong light, as that of the candle or fire; she could, however, perceive the motion of the hand when waved before the eyes. She had occasionally suffered rather severely from head-ache, and was sometimes troubled with a cough; but her health, although she was infirm, as might be expected from her great age, was usually good.

About eight years before she received a blow over the *right eye*, and from that time had been unable to see with it. With this eye *she could not perceive a lighted candle, when held so close as to be sensible of its heat*. This experiment I made very carefully, and came to the conclusion that this eye was most probably amaurotic. The pupil, however, contracted and dilated with the varying intensity of the light, but less actively than natural, or as compared with the other eye. It was also habitually more contracted than that of the other eye, and was not perfectly circular, being apparently slightly adherent at one point to the capsule of the lens, the capsule being opaque throughout. The vision of the *left eye* had been seriously impaired only during the last year. With this eye, as before stated, she could readily discern a light, and the pupil was very active. The opacity was of a grayish colour and evidently seated in the crystalline body, as there was a small transparent space observable behind the iris.

The general appearance of both eyes was healthy, the corneæ rather small, and the anterior chambers not very spacious; the eye-brows were likewise rather prominent and the eyes somewhat sunken, but not to such an extent as, in my judgment, to contra-indicate the operation of extraction, to which I advised her to submit. Previous to the operation being performed, she was directed to take some aperient medicine, which operated rather freely on the bowels.

April 18th. This morning, according to previous arrangement, she was prepared to submit to the operation. She was accordingly placed on a sofa, with the head raised, and I seated myself on a music-stool behind her. I commenced with the *left eye*. The usual incision through the upper half of the cornea was readily effected with my double-edged extraction-knife. The curette was next passed into the pupil, so as to lacerate the capsule; after which, slight pressure with the scoop at the lower portion of the eye-ball speedily expelled the opaque crystalline, which was of a decided amber colour and very firm; very little vitreous humour escaped with the lens, but there was a rather free discharge of it shortly afterwards. Two strips of adhesive court-plaster were then laid vertically over the lids, and secured on the brow and face.

Deeming it desirable that she should have a chance for the recovery of both eyes, (after allowing her a few minutes' repose,) I proceeded to the operation on the *right*, although regarding the result as somewhat doubtful. I made a similar incision in the upper half of the cornea of this eye. Greater irritability on the part of the patient was evinced during this than at the former operation, and the *eye rolled upwards and inwards somewhat out of view*. A good incision was, *however, effected*, and the opaque lens escaped immediately on the withdrawal of

the knife. This lens was also of a deep amber colour, rather less than that of the other eye, and, *discharged with it, was a quantity of pulsataceous matter*, which was probably the outer portion of the lens partially dissolved from the injury received eight years before. A membranous substance, being evidently *the opaque capsule*, was likewise discharged at the same time. Strips of plaster were then passed over the lids, as in the other eye. No vitreous humour was lost at this operation. She was directed to remain on the sofa in the recumbent position until towards evening, and then to be removed carefully to bed. As she was occasionally troubled with cough during the night, a demulcent mixture, with laudanum, was prescribed to allay any bronchial irritation that might arise.

April 19th. She had some pain in the left eye during yesterday and last night, but it had much abated this morning; there was also some discharge of water from this eye yesterday afternoon, but this too had ceased. The right eye had been very easy. She did not sleep much, but was not teased with coughing during the night. The dressings were not removed.

April 20th. The patient was much the same as yesterday. She still complained of pain in the left eye. After the dressings were removed, a considerable quantity of mucous discharge was found to have accumulated about the left eye, and a less quantity about the right. There was a considerable amount of intolerance of light, and it was difficult to see the condition of the eyes. The bowels not having acted since the operation, a mild purgative was prescribed. There was no constitutional disturbance, but the cough had been rather troublesome.

April 21st. The left eye was still painful, and there was a small quantity of mucus adherent to the dressings. With the right eye, she could distinctly perceive her hand, and there was an entire freedom from pain. The dressings were re-applied.

April 23rd. The right eye looked extremely well; no undue amount of vascularity, and no pain. She could open it freely, and distinguish the colours of the bed-clothes. The left was much inflamed, and a great deal of mucous discharge exuded when the lids were separated; the lower portion of the cornea appeared clear, but the upper had an opaque and rather sloughy aspect, and the eye continued painful and unable to bear exposure to light.

It is unnecessary to detail the further progress of this case. The inflammatory condition of the left eye continued for several weeks and terminated in extensive opacity of the cornea and partial atrophy of the globe. The right progressively improved, retarded somewhat, probably, by the disturbance of the other organ; but very excellent vision was ultimately restored, so that, with the aid of the usual convex spectacles, she was able to read with fluency.

This case is interesting, as illustrating the uncertainty of diagnosis, and of the result of operations on the visual organs. The eye which, previous to the operation, appeared to be amaurotic, was restored to perfect vision; whilst the other, which seemed so very promising, was destroyed by the subsequent inflammation and ulceration.

CASE 5.—A. C., *æt.* 64, had been the subject of cataract for several years; the left eye was the first to be rendered useless, and the operation for depression had been performed upon it, by an eminent surgeon, two or three years before. This operation had failed, the eye having been subsequently affected with deep-seated inflammation, terminating in general disorganisation. The right eye had been gradually getting darker, and he was at length unable to follow his employment, although still retaining some degree of sight. The lens was of a brownish, amber colour, particularly towards the centre; the capsule transparent, the opacity being seated at a little distance behind the pupil, displaying the dark shadow cast by the iris on the cataract; the motions of the pupil were tolerably active, and there was no evidence of any affection posterior to the lens, the eye having a plump, healthy appearance, and possessing the natural degree of firmness. He was himself desirous that the operation of extraction should be resorted to, and applied to me to know if I were willing to operate. Seeing nothing to contra-indicate extraction, and having the bad success of the previous operation in view, I undertook the performance of it, although with some foreboding as to the result. The patient being placed on a sofa, as in the other cases, I proceeded to make the upper section of the cornea. No difficulty was experienced, the patient being very steady. The operation was completed in a very few seconds, for the moment the incision was effected, the lens was observed lying on the outside of the eye, and with it a very large quantity of aqueous fluid, evidently the disorganized vitreous humour. The front of the eye exhibited a large concave-depression, having the appearance as if it had been completely emptied. There had been no spasmodic action of the muscles, nor any undue pressure on the globe; the cataropthe was evidently the result of dissolution of the vitreous body, a condition which had not been anticipated from the symptoms. The lids were approximated, and kept together by adhesive strips; the patient was directed to remain for three or four hours on the sofa, and then to be removed cautiously to bed. When I saw him on the following morning, I was astonished to find streaks of blood, which were now perfectly dry, and which had evidently trickled down from the eye over the face and neck in several streams, and in such quantity as to stain the shirt-collar very considerably. This, it appeared, had occurred in the afternoon or evening after the operation. On separating the lids, the cornea was seen to be covered with a coagulum of blood. As the bleeding had ceased, I did not interfere with the eye, but reapplied the dressings. The next day, the hæmorrhage was found to have come on occasionally, and run down the face as before, and, indeed, continued at intervals for nearly a fortnight. The eye itself was, for the first two or three weeks, considerably inflamed, the inflammation being of the erysipelatous character. Seeing that no treatment could be of any use, I merely kept the plaster-dressings on the lids, and directed the eye to be bathed with warm water whenever they were removed. The inflammation gradually subsided, and with it there was a general shrinking and atrophy of the globe, and vision, of course, destroyed. The source of the hæmorrhage I am at a loss to account

for, but suppose that it must have arisen from the central artery of the retina, which, after the evacuation of the humours, was left unsupported, and probably gave way, having been, perhaps, previously the subject of some morbid change; certainly no injury was inflicted on any texture during the operation, which could have given rise to it. The case is a very uncommon one; but Mr. Tyrrell relates two cases where hæmorrhage occurred afterwards; in these, however, it appeared to be caused by the employment of a hook to extract the lens. A similar case is related by M. La Faye, in the Memoirs of the Royal Academy of Surgery in Paris. Mr. Guthrie also mentions a case which occurred in his own practice, as well as two others in that of Mr. Soden, of Bath. (Lecture in the Medical Times, vol. xi. p. 220.)

#### EXTRACTION THROUGH THE SCLEROTICA.

It has been recommended to attempt the extraction of cataract through an incision into the sclerotica, instead of the cornea. In this mode of operating, it was probably imagined that, (the cornea being left intact,) there would be no danger of opacity of that texture, as well as of some other evils, such as prolapsus of the iris, being induced, results which occasionally follow an extensive wound of the transparent front of the eye; but, on the other hand, judging from the effects of wounds inflicted accidentally, there can be little doubt that much greater mischief would arise from an incision into the sclerotica of sufficient size to admit the egress of the lens; a proceeding which must necessarily injure the choroid and retina, and probably be followed by protrusion of those textures and of the iris, with considerable loss of the vitreous humour, and, in many instances, atrophy of the globe; the general indisposition, too, of wounds of the sclerotica to unite, is of itself almost a sufficient objection to this operation. Sir James Earle and some other surgeons of eminence, have repeatedly had recourse to it; but, although in some instances it proved successful, yet it does not appear to have been sufficiently so as to cause its general adoption.

#### DEPRESSION OF CATARACT, OR COUCHING.

In performing this operation, the surgeon, instead of removing or extracting the opaque lens from the eye, merely pushes it below the axis of vision, either into the vitreous humour, or between it and the retina, so as to form a free passage for the rays of light, and in the expectation that the cataract will ultimately be absorbed. This is an operation which is

easily performed, and were it equally successful with extraction, would, therefore, be much to be preferred. It would seem, however, that the very frequent instances of failure after depression, led those who were previously in the habit of practising it to substitute the more successful operation of extraction. No doubt depression is still the only operation that can be safely practised under some circumstances, as when the eye is much sunk in the orbit, when the cornea and iris are nearly in contact, so as to leave a very small anterior chamber, or when the patient is so extremely irritable and unsteady, as to render an attempt at extraction unadvisable.

The principal argument adduced against the operation of couching is, that the pressure of the hard lens, when displaced into the vitreous humour, or in contact with the retina, cannot fail to be productive of internal inflammation, which must, sooner or later, terminate in complete amaurosis. I have before related a case of this description, when describing retinitis, at page 219. The opaque lens, it is alleged, when removed from its natural situation, is no longer a portion of the animal economy, but, like so much dead matter, acts as a foreign body in the eye, and tends to excite irritation in the textures with which it is in contact. No doubt, in many instances, such is the case; and often, after the immediate danger has subsided, a slow disorganizing inflammation is established, and amaurosis is the result: still, in other instances, it must be allowed that no such effects follow; but, on the contrary, vision is restored, and continues for the rest of life.

The amount of inflammation which succeeds to the operation for depression is, as is the case with other operations on the eye, exceedingly variable. In some persons, we know that the most acute inflammation will follow the slightest operation; and, on the other hand, a very trifling amount of inflammation will sometimes succeed the most important operation. This is so much the case, that I am inclined to think that the result often depends as much upon the peculiarity of individual constitution, as upon the particular operation resorted to. Nevertheless, there are circumstances that will either retard or facilitate an attack of inflammation, as, for example, the actual position of the displaced lens, whether it be in contact with a highly-organized and sensitive body, as the retina or iris, or with one of opposite qualities, as the vitreous or aqueous humours.

The operation of couching, though easy of execution, demands a certain amount of nicety and precision for its safe and efficient performance. Before commencing the operation, it is necessary that the pupil be fully dilated, in order to obtain a proper view of the proceedings and to avoid the risk of injuring the iris. For this purpose, the extract of belladonna, moistened to the consistence of thick cream, should be smeared over the eye-brows and lids, and allowed to remain for one or two hours previously; or the same may be applied over night, spread upon soft linen, and the whole removed and washed off on the following morning, prior to the period of operating.

*Operation.*—The position of the patient is not very material. He may be placed either horizontally, as on a sofa, or in the upright position, on a suitable chair. An assistant will be required to secure one or other of the lids, as in extraction. The only instrument necessary is a spear-shaped needle, curved at its extremity. Having perforated the globe, at the distance of about two lines posterior to the temporal margin of the cornea, the needle should be employed in such a manner as to lacerate the posterior hemisphere of the capsule, and, at the same time, to make an opening into the vitreous body, at its lower portion, for the reception of the lens. The point of the instrument, its concavity directed towards the cataract, should then be passed between the circumference of the opaque lens and the iris into the anterior chamber, the anterior portion of the capsule lacerated, and the lens itself pushed downwards into the opening previously made in the vitreous body, so as to be quite below the margin of the pupil and out of the axis of vision. There is usually a difficulty in causing the lens to remain in the new position assigned to it after this operation; and in order, as much as possible, to prevent its again rising into the pupil, it is necessary to keep the needle for a short time within the eye, and in contact with the cataract. It will, notwithstanding, very often, so soon as the needle is removed, be found that the lens has again risen, and occupies at least a portion of the pupil.

*Reclination.*—By some practitioners, the lens, instead of being depressed immediately behind the ciliary body, and in the perpendicular direction, is turned backwards and downwards horizontally, with its anterior surface directed towards the upper and its posterior surface to the lower part of the globe; and this modification is termed *reclination*. The advantage of this variation in the proceedings is thought to consist in

the diminished chance of injuring the retina, and of exciting internal ophthalmia. In performing this operation, the needle should be introduced at the lower portion of the eye-ball, instead of the temporal side.

I have said, that the operation of couching is not difficult to perform. I ought rather to have said, that the steps of the operation are easily executed, because it is very difficult indeed to depress the lens into the vitreous body. Most commonly, when the lens is pushed against the vitreous body, with the intension of immersing it therein, (that body being in its normal condition,) nothing more than a revolving motion is communicated to it, it is pushed before the cataract, and the relative position of both lens and vitreous humour to the rest of the eye is, for the time, altered; but, so soon as the propelling power, viz., the instrument, is withdrawn, these bodies usually return to their original situation, and every thing remains as before. This is, at least, a very frequent occurrence; and when it does not happen, probably the vitreous body is preternaturally fluid, or the lens is pushed between that body and the retina. I have made some experiments on the dead eye, and have found much difficulty in immersing the lens within the vitreous body; so much so, that I regard it as doubtful if depression of a cataract within it is really, effected in most cases in which it is supposed to be. The very common occurrence of its again rising into the pupil favours this view; this it usually does almost immediately after depression, but, in some instances, several days will elapse, before it is observed.

*After Treatment.*—The general treatment after the operation for depression must be similar to that for extraction, but the local applications should be somewhat different. The eye-lids should be covered with a plaster of the extract of belladonna, spread on soft linen, which should be frequently moistened, and changed two or three times in the course of the day and night. This will keep the pupil in a state of dilatation, so that we shall be enabled to ascertain the situation of the depressed lens, and, in the event of its resuming its original position, avoid the risk of exciting inflammation of the iris. The inflammation which follows this operation is seldom so severe, nor are the symptoms so urgent, immediately afterwards, as in the case of extraction. The injury inflicted on the eye likewise, at the period of operating, is not so great in depression as in extraction, and, consequently, the reaction is neither so instantaneous nor so excessive, although it may ultimately be productive of the same or even a

greater amount of mischief. To reduce the inflammation, it is frequently necessary to bleed both locally and generally; and, in addition to the ordinary antiphlogistic treatment, as the internal textures are more likely to be affected, it will generally be proper to exhibit mercury, and, after a certain period has elapsed, to resort to counter-irritation.

*Rising of the Cataract.*—When the cataract re-appears in the pupil, some practitioners recommend that the operation for depression should be repeated; and Mr. Hey states that he has, in some instances, done this five or six times over. In such an event, I should think it better to wait; because there is a chance that the cataract, if it resume its original situation, and is in contact with the aqueous humour, will gradually disappear by the process of absorption. Such an occurrence I have occasionally witnessed. If, in this situation, it should appear to be exciting much irritation within the eye, it would probably be better to attempt its removal by extraction.

Although, in some instances, the absorption of a hard cataract, when depressed, may be effected, yet, when it is removed from the influence of the aqueous humour, this is a very slow and uncertain process. Beer has related a case in which an opaque lens, in consequence of a blow, reappeared in the pupil, after having been depressed thirty years.

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## SECTION II.

### SOFT CATARACT.

The soft is, in general, easily distinguished from the hard cataract, by its occurring in young and middle-aged persons, and by its different appearance within the eye, the soft cataract being usually of a milky white, whilst the hard, as before explained, is more commonly of a yellowish or amber colour, although not invariably so. This difference of colour renders it more distinct and striking to the observer, so that it is perceptible on a very superficial view of the organ, from the contrast which it exhibits to the clear black of the natural pupil and the darker shade of the iris.

The degree of softness of the opaque lens is commonly proportionate to the age of the patient. In very young persons and in children it is frequently quite fluid, so that, when the anterior capsule is ruptured,



it flows out into the aqueous humour and renders it quite turbid, when the case is termed *milky cataract*. In middle-aged individuals, on the other hand, the lens acquires an increase of firmness, but still it wants that degree of solidity which it attains at a more advanced period of life; and this is sometimes named *caseous cataract*, because it is of the consistence of soft cheese or butter.

In cases of soft cataract, the lens is usually much larger, more convex, and approaches more nearly in contact with the iris; sometimes, indeed, pushing it forwards, so as to give it a bulging appearance. The loss of vision, too, is generally more complete in soft than in hard cataract. This arises from the circumstance that the opacity is more generally diffused through the different laminae in the former, while in the latter it is more frequently confined to the central layers. After all, however, there is some uncertainty in the means of determining as to whether the opaque lens be of a soft or firm consistence. The colour of the opacity, as before pointed out, should be considered to indicate the seat of the morbid change, rather than the actual consistence of the opaque lens, since it is commonly of a whitish and striated appearance when affecting the outer-layers, even at an advanced period of life. Nor is the age of the patient at all times a perfect criterion, for the cataract is sometimes rather firm in young, and not always so in elderly persons; and it sometimes happens that the lens is soft in one eye and firm in the other.

#### DIVISION OF CATARACT.

The operation usually preferred for soft cataract is that of *division*, by which the texture of the lens is more or less pierced and broken up. The particular object of the surgeon in performing this operation is the exposure of the opaque body to the action of the aqueous humour. To effect this, it is of course necessary that the anterior hemisphere of the capsule be lacerated, when solution, or, more properly, absorption commences, and the cataract, after a certain period, gradually becomes dissipated, and finally disappears. Hence this operation is sometimes spoken of as the *operation for solution* or *absorption*. There is no reason for supposing that the aqueous humour actually dissolves the substance of the lens by any chemical or mechanical process. This fluid, however improbable such a supposition may appear at first view, might almost be regarded as

endowed with vitality, so that, when any foreign body is immersed therein, its absorbent vessels are excited to action, and soon effect the entire removal of the body. We know that effusions of blood and other matters frequently take place into the aqueous humour, and are very rapidly removed by the process of absorption. Solid substances are also not unfrequently removed by the same process. So it is with the crystalline lens. If that body be left exposed to the aqueous humour, or portions of it immersed in that fluid, absorption proceeds, and, after a time, the removal of the opaque substance will be completely effected.

*Operation.*—Before proceeding to the operation which is to produce these effects, precisely the same preparation is requisite as that previously mentioned for the operation of couching. The pupil must be well dilated, by the free employment of extract of belladonna to the eye-brows and lids, or a small portion applied to the conjunctival surface of the eye, by means of a camel's-hair pencil, introduced into the inner canthus. The instrument required is the ordinary spear-shaped, straight cataract needle. The point of the needle having been made to perforate the coats of the eye, posterior to the junction of the cornea and sclerotica, in the manner before described, is carried between the outer margin of the lens and the pupillary edge of the iris into the anterior chamber; the anterior hemisphere of the capsule is then to be freely lacerated, and the needle passed into the lens, so as to break up its substance to a greater or less extent.

The immediate effect of this operation will materially depend on the consistence of the cataract; if it be fluid, or very soft, perhaps a considerable portion will escape through the opening of the capsule into the aqueous humour; if it be firmer, no change of this description will be discernible. It is generally considered proper not to use the needle too freely in the first operation, in order to avoid displacing the lens, particularly if it be of a rather firm consistence. We need seldom do more than lacerate the capsule; but this should be done effectually, so as to cause a moderate surface of the lens to be exposed to the aqueous humour, and to diminish the chance of a closure of the opening in the capsule, and of the subsequent formation of capsular cataract.

*Repetition of the Operation.*—It occasionally happens that a single operation is sufficient to cause the disappearance of an entire cataract, both lens and capsule. In the vast majority of cases, however, several repetitions of the operation are necessary; sometimes as many as six or eight,

or even more; and in these the needle may be passed very freely through the remaining portions of the cataract. The time required for the absorption of a cataract is also very uncertain; in young children it often happens, particularly when fluid, that the whole disappears in the course of a few days. The most rapid absorption I have known in an adult, occurred in about ten days from the period of operating, the patient being at the time the subject of diabetes. More commonly, it is many weeks, and sometimes several months, before the absorbent process is perfected. In general, five or six weeks should be allowed to elapse between each successive operation, or until all irritation has completely subsided.

In the event of a subsequent operation being required, a considerable portion of the lens having been absorbed, its further removal may often be expedited by bringing it forwards into the anterior chamber, which is easily accomplished with the needle when the pupil is well dilated. If the remaining portion should prove to be larger or more solid than was anticipated, such as the nucleus is sometimes found to be, there may be some risk in attempting this, since it may press against the iris and cause inflammation of its texture and (a frequent result) closed pupil and adhesion to the capsule. Rather than permit this, it would be preferable to puncture the cornea, and evacuate the remaining fragment of the lens. The regular employment of the extract of belladonna, so as to keep the pupil well dilated, with strict antiphlogistic treatment, will, however, in many cases, prevent the necessity of such a proceeding.

*Keratonyxis.*—The operation for division of the cataract is sometimes performed by introducing the needle through the cornea, instead of the sclerotica, into the anterior chamber. This operation has been named, by the Germans, *keratonyxis*, from two Greek words, signifying puncture of the cornea. The needle is introduced through the cornea, near its temporal margin, at about two lines distance from its junction with the sclerotica, when the anterior hemisphere of the capsule is pierced and lacerated, and the lens partially broken up.

The operation of *keratonyxis* appears to be most suitable when the object is simply to lay open the capsule, and is, therefore, best adapted to those cases in which the lens is very soft or fluid. For breaking up the substance of the cataract, it does not seem so applicable, inasmuch as the operator has not so great a control over the eye or the instrument, as when the latter is passed through the sclerotica and into the posterior chamber.

Great care should always be taken to have the pupil amply dilated by the use of belladonna, because there will be greater risk of injuring the iris by this than by the posterior operation.

Some surgeons prefer this operation, because they suppose that the liability to an attack of inflammation is less after it than after that through the sclerotica. It is likely that such may be the case generally, but I have known instances of the most violent and long-continued attacks of ophthalmia to result from the performance of this operation. Such, indeed, is frequently the case after any kind of needle operation; and he who resorts to this instrument in the expectation that his patient will be free from the risk of subsequent, and even severe and long-continued inflammation, will find himself much deceived in practice.

The principal risk after the operations for division of the cataract, arises from the mechanical pressure of the lens, which, when very large, or of a somewhat firm consistence, may be expected to act as a foreign body in the eye. Remaining in the immediate vicinity of the iris, and often in actual contact with it, inflammation of that texture frequently succeeds, and is very apt to result in effusion of lymph into the pupil, the effused matter often becoming organized, the lens, capsule, and iris agglutinated, and the pupil completely obstructed, or even obliterated. Nor is the mischief at all times confined to the iris; the morbid action occasionally extends to the retina, and amaurosis and general disorganization of the globe sometimes follow.

During an attack of inflammation, the absorption of the cataract is suspended; and if the attack be severe, deposition, as I have just said, is frequently substituted, and effusion of lymph, or some other morbid production, takes place. So soon as the inflammation is checked, the absorbent process recommences, and is finally completed, with the exception, usually, of a portion of the capsule. The chief means of arresting inflammation of the iris and of the internal textures of the eye, after these operations, are such as I formerly described, viz., bleeding, both local and general, (according to the severity of the attack, and the constitution and other circumstances of the patient,) the internal exhibition of mercury, and the application of belladonna externally. To avert such an attack is often impracticable; but the same precautionary measures are to be adopted as before recommended after the operations of extraction and depression;

and, perhaps, the most important preventive remedy is the local employment of the belladonna, so as to keep the pupil well dilated.

*Unfavourable Results of the Operation of Division.*—A not unfrequent termination of the operation of division and the subsequent absorption of the cataract, and one which I conceive has not been sufficiently pointed out, is that of atrophy of the eye. It would seem that the process of absorption is not always limited to the cataract, but occasionally extends to the vitreous humour and the other structures of the globe. I have seen many instances of such a result, not confined, indeed, to the operation for cataract, but likewise in cases where the lens had been injured by sharp instruments accidentally passed into the eye. Nor is it to be wondered at that the repeated introduction of an instrument within the interior of the eye,—a proceeding which must inevitably break up the delicate cells of the vitreous body, together with the irritation consequent thereupon, and on the presence of the disorganized lens, combined with an unnatural excitement of the absorbent vessels, kept up for many weeks or months,—should be succeeded by a much greater amount of absorption than was originally contemplated, and that ultimately a large portion of the fluid contents of the globe should disappear. The wonder is, that so much can be done in the way of interference with the vitreous body, during the various operative proceedings on the eye, with such frequent impunity.

Dr. Mackenzie appears to entertain somewhat similar views to those which I have just expressed. “Has the process of solution and absorption of the lens (says he) no exhausting effects upon the internal parts of the eye? Are these parts left as sound, after this process has been accomplished, as after extraction, in neither case inflammation having occurred? To these questions I must answer, that after the process of solution and absorption is completed, we frequently observe undeniable signs of the internal textures of the eye having suffered, not from inflammation apparently, not from irritation, but rather from exhaustion. The iris, particularly, becomes paler and more flaccid than natural, the pupil smaller and its motions less vivid; while, in some cases, the wasting of the eye extends more deeply, the vitreous humour shrinks, and the retina becomes more or less insensible.” It is important that these facts should be borne in mind, because we find some writers vaunting of this operation, that it is not only the most simple in point of execution, but likewise the most

successful in its results, and, indeed, that it is well calculated to supersede all the others. Of the incorrectness of such a statement I can speak in the most decided terms, from frequent experience of the results I have mentioned.

DIVISION AND SUBSEQUENT EXTRACTION OF THE CATARACT.

Another operation, sometimes practised for the cure of soft cataract, may be termed the *compound operation*, because it combines that of division with extraction. It was first resorted to by Mr. Gibson. That eminent surgeon was desirous of abridging the long and tedious process which is usually required for the complete removal of a cataract, even when not of very firm consistence; and we may presume that he had also in view the prevention of the many evils which so frequently result from allowing a disorganized lens to remain for weeks and months in the interior of the eye. He thought it would be better practice to remove so constant a source of irritation. With these views, he proceeded, first of all, to perform the operation for division, by rupturing the capsule and breaking up the substance of the lens; and afterwards, when the eye had recovered from the effects of the previous operation, and the cataract had become softened and partially absorbed, to extract the remainder by a small incision in the margin of the cornea. Mr. Gibson generally allowed two or three weeks to pass between the first and second operations. There will, no doubt, be a better chance of the cataract becoming softened into a pultaceous or more fluid mass by such a delay; but I have frequently extracted in four or five days after the needle operation, with perfect success, when much irritation appeared to have been excited by the displaced or broken-up lens. The opening into the anterior chamber should be made at the temporal margin of the cornea, at about the distance of one line from its junction with the sclerotica, by means of an extraction-knife! The size of the aperture should depend upon the probable consistence and magnitude of the remnant of the cataract. Generally speaking, if the point of the double-edged knife be carried into the pupil and made to touch the capsule, so as to puncture it slightly, the opening in the margin of the cornea will be of sufficient size to admit of the escape of the partially-dissolved lens. If it do not escape by this means, the scoop must be introduced into the wound and quite into the pupil, when the cataract, sometimes fluid and at others in softened fragments, passes along the concave surface of the instrument and out of the eye.

easily performed, and were it equally successful with extraction, would, therefore, be much to be preferred. It would seem, however, that the very frequent instances of failure after depression, led those who were previously in the habit of practising it to substitute the more successful operation of extraction. No doubt depression is still the only operation that can be safely practised under some circumstances, as when the eye is much sunk in the orbit, when the cornea and iris are nearly in contact, so as to leave a very small anterior chamber, or when the patient is so extremely irritable and unsteady, as to render an attempt at extraction unadvisable.

The principal argument adduced against the operation of couching is, that the pressure of the hard lens, when displaced into the vitreous humour, or in contact with the retina, cannot fail to be productive of internal inflammation, which must, sooner or later, terminate in complete amaurosis. I have before related a case of this description, when describing retinitis, at page 219. The opaque lens, it is alleged, when removed from its natural situation, is no longer a portion of the animal economy, but, like so much dead matter, acts as a foreign body in the eye, and tends to excite irritation in the textures with which it is in contact. No doubt, in many instances, such is the case; and often, after the immediate danger has subsided, a slow disorganizing inflammation is established, and amaurosis is the result: still, in other instances, it must be allowed that no such effects follow; but, on the contrary, vision is restored, and continues for the rest of life.

The amount of inflammation which succeeds to the operation for depression is, as is the case with other operations on the eye, exceedingly variable. In some persons, we know that the most acute inflammation will follow the slightest operation; and, on the other hand, a very trifling amount of inflammation will sometimes succeed the most important operation. This is so much the case, that I am inclined to think that the result often depends as much upon the peculiarity of individual constitution, as upon the particular operation resorted to. Nevertheless, there are circumstances that will either retard or facilitate an attack of inflammation, as, for example, the actual position of the displaced lens, whether it be in contact with a highly-organized and sensitive body, as the retina or iris, or with one of opposite qualities, as the vitreous or aqueous humours.

The operation of couching, though easy of execution, demands a certain amount of nicety and precision for its safe and efficient performance. Before commencing the operation, it is necessary that the pupil be fully dilated, in order to obtain a proper view of the proceedings and to avoid the risk of injuring the iris. For this purpose, the extract of belladonna, moistened to the consistence of thick cream, should be smeared over the eye-brows and lids, and allowed to remain for one or two hours previously; or the same may be applied over night, spread upon soft linen, and the whole removed and washed off on the following morning, prior to the period of operating.

*Operation.*—The position of the patient is not very material. He may be placed either horizontally, as on a sofa, or in the upright position, on a suitable chair. An assistant will be required to secure one or other of the lids, as in extraction. The only instrument necessary is a spear-shaped needle, curved at its extremity. Having perforated the globe, at the distance of about two lines posterior to the temporal margin of the cornea, the needle should be employed in such a manner as to lacerate the posterior hemisphere of the capsule, and, at the same time, to make an opening into the vitreous body, at its lower portion, for the reception of the lens. The point of the instrument, its concavity directed towards the cataract, should then be passed between the circumference of the opaque lens and the iris into the anterior chamber, the anterior portion of the capsule lacerated, and the lens itself pushed downwards into the opening previously made in the vitreous body, so as to be quite below the margin of the pupil and out of the axis of vision. There is usually a difficulty in causing the lens to remain in the new position assigned to it after this operation; and in order, as much as possible, to prevent its again rising into the pupil, it is necessary to keep the needle for a short time within the eye, and in contact with the cataract. It will, notwithstanding, very often, so soon as the needle is removed, be found that the lens has again risen, and occupies at least a portion of the pupil.

*Reclination.*—By some practitioners, the lens, instead of being depressed immediately behind the ciliary body, and in the perpendicular direction, is turned backwards and downwards horizontally, with its anterior surface directed towards the upper and its posterior surface to the lower part of the globe; and this modification is termed *reclination*. The advantage of this variation in the proceedings is thought to consist in



make the point act as a drill ; and having thus secured an opening more free than could be effected by a simple puncture, the needle is withdrawn." The chief objection to this operation is the number of times that it requires to be repeated. Mr. Tyrrell mentions that in one case the operation had to be repeated nine times, and that the average number is seven or eight times. In some of his cases, too, it became necessary to resort after all to an operation for artificial pupil. The advantage he states to be that so little irritation follows the operations thus conducted, from the circumstance of the lens being so slightly displaced, and consequently the little risk of exciting internal inflammation.

In cases of the description in which Mr. Tyrrell advised the operation of drilling, I have lately performed the compound operation previously described, viz., first lacerating the capsule by the anterior operation with a moderate sized needle, the instrument at the same time perforating the lens so as to break it up without displacing it, and then in about a week extracting the softened lens with the grooved needle-knife. In performing the first operation with the needle a sufficient rent is made in the capsule to allow of portions of the dissolved lens to come forward into the anterior chamber. Care is of course taken not to injure the iris. In performing the second operation, the grooved needle-knife is of such a size that when it has perforated the capsule it makes an aperture of sufficient size as frequently to leave the pupil free from opacity after the evacuation of the lens. When this is not the case, the capsule must afterwards be broken up with the needle introduced posteriorly to the iris, or an artificial pupil made.

#### EXTRACTION THROUGH A QUARTER SECTION OF THE CORNEA.

This method of treating soft cataract is recommended by Mr. Travers, who makes a quarter section of the cornea with the extraction-knife, and, at the same time, dips the point of the instrument into the pupil, so as to open the capsule, and bring the cataract away at once : if the lens be quite soft or fluid, it will escape with the aqueous humour ; if it be of firmer consistence, the introduction of the scoop will be necessary to dislodge it. This operation is, like that of Mr. Gibson, only to be recommended in cases of soft or fluid cataract ; it is more particularly suited to the latter ; but as these only occur in children, in whom absorption is so readily and rapidly effected, it may be doubted whether it is an operation that will be *frequently* necessary or proper.

## SECTION III.

## CAPSULAR CATARACT.

It sometimes happens that the capsule alone is the seat of the morbid change of which I have been speaking in the two last sections, the crystalline itself retaining its transparency. The anterior hemisphere is most frequently thus affected, and the affection is commonly the result of deposit of opaque matter during an attack of iritis. Opacity of the capsule is often of very limited extent; in some instances there being merely little white spots or streaks, about the size of a pin's-head, or even less: these I have before spoken of as an occasional result of the purulent ophthalmia of infants, and as being termed *cataracta stellata*. When the opacity is of this partial character, vision is in general not materially impaired, and then no interference is requisite; but, if the whole or a large portion of the anterior capsule is opaque, vision will then be as much injured as if the lens were similarly affected, and the same treatment will be demanded for its removal.

When the anterior capsule is the seat of opacity, it is readily ascertained by its situation, being immediately behind and almost in close contact with the iris, as well as from its perfectly white, pearl-like appearance. In instances in which the opacity has resulted from an attack of iritis, there will usually be likewise more or less adhesion of the capsule to the posterior surface of the iris. When the capsule alone is free from disease, this condition is named *primary* capsular cataract. If the posterior hemisphere of the capsule be alone affected, it is indicated by a deep-seated, perfectly white appearance of this texture, of a concave form stretching completely across the posterior chamber, and usually dotted over with transparent intervening spaces. Vision, though much impaired, is seldom destroyed by posterior capsular cataract, but the opacity is very apt to extend to the lens, and then the sight is more seriously injured.

CASE.—S. A. H., aged 20, applied to me on account of a defect of vision of both eyes, especially of the left, which latter was entirely useless. The affection had been coming on during the last twelve months, and had gradually increased in intensity. She had never had any inflammatory affection of her eyes, nor had they been the subject of any accident.

On examination, the eyes presented a generally healthy aspect; but on looking

into the pupil of the *left*, evidences of opacity of the capsule were distinctly visible, principally in its posterior hemisphere, which had a peculiar spotted or streaked appearance, perfectly white, stretching across the posterior chamber at a considerable distance from the iris. There was also a single white spot on the anterior hemisphere of the capsule, near its centre, and another about double the size, but not larger than a pin's head, immediately behind the former, and apparently seated in the outer laminae of the crystalline body, which was otherwise perfectly transparent. In the *right* eye, the opacity was limited to a single white spot on the centre of the anterior hemisphere of the capsule. The vision of this eye was not sufficient to enable her to attend to her employment; and as it appeared to be getting worse, she was very desirous that something should be done for the restoration of that of the other. She was accordingly admitted into the hospital for the purpose of undergoing the usual operation.

June 25th, 1842. The pupil of the *left* eye, having been previously dilated by the use of the extract of belladonna, a straight needle was employed to perforate the sclerotica and break up the lens and capsule. A plaster of the moistened extract of belladonna was reapplied and the patient removed to bed.

June 29th. The usual antiphlogistic treatment had been resorted to, and there had been but slight appearance of inflammation since the operation. The pupil had been kept well dilated, and the lens appeared as a soft pultaceous mass, a considerable portion of it passing forward into the anterior chamber.

July 2nd. For the last two days she had suffered much pain about the eye and head, and there was considerable vascularity of the outer tunics, the pink coloured vessels predominating. Considering that the position of the lens, partly in the anterior chamber and in immediate contact with the iris, had excited and was calculated to keep up the irritation, and looking also to the future success of the operation, I determined to extract the softened lens through a small aperture in the cornea. That operation was accordingly performed; the extraction knife was passed into the anterior chamber at the outer margin of the cornea, the point of the knife being carried into the centre of the pupil, the aqueous humour and more fluid portion of the lens escaping through the aperture; the scoop was then passed through the wound of the cornea into the pupil, when the remaining portion of the lens was evacuated, leaving the pupil clear, with the exception of a few fragments of opaque matter and the capsule. Strips of plaster were then applied to keep the lids in contact, and the patient put to bed.

July 3rd. She had considerable pain yesterday after the operation, which continued all night, but was much abated this morning. The vascularity of the eye was not increased; the pupil was well dilated and a considerable part of it clear; she could distinctly observe surrounding objects, but owing to the irritation could not bear to exercise the organ. A belladonna plaster was ordered to be applied, and a mild purgative administered.

July 9th. The patient had gone on very favourably since last report, having had but little uneasiness and the vascularity being much diminished. There were still two or three fragments of opaque lens in the pupil and anterior chamber, but they had a soft flocculent appearance; and a large central aperture was visible in the opaque capsule. Nothing untoward occurred after this. The opaque matter was gradually absorbed, and very good vision restored, a small portion of capsule only being observed around the margin of the pupil when much dilated.

After the compound operation, as well as when the needle only is employed, we are generally called upon to resort to an operation for the removal of the opaque capsule. When using the scoop for the purpose of removing the more solid portion of the opaque crystalline, that instrument may in most instances be so employed as to make a large central aperture in the posterior part of the capsule, and thus the necessity for ulterior proceedings will be obviated, as happened in the case just related. The same remark will apply to the use of the grooved needle-knife.

In many cases of capsular cataract, the lens is entirely absorbed and the capsule alone remains. This variety of cataract is most commonly observed in the congenital form of the disease. In such cases, the lens will have undergone spontaneous absorption, the two hemispheres of the capsule united and adherent, and forming a tough, white membrane, like parchment, over which the absorbents appear to possess no power.

Very frequently, capsular cataract is only a *secondary* affection, and results from an insufficient laceration of the anterior hemisphere during an operation for the removal of lenticular or capsulo-lenticular cataract. It most commonly occurs after the operation of division, as well as in cases where the capsule and lens have been injured accidentally; and the quantity of the opaque capsule is generally in proportion to the severity of the accompanying inflammation, and the length of time which the lens requires for its removal. When the inflammatory action has been severe and long continued, there is often considerable deposition of lymph upon the texture of the capsule, and a great increase of its density is the consequence, so that it often assumes a coriaceous, gritty, or even chalky appearance. This tough and thickened membrane is not much influenced by the action of the absorbents. Under any circumstances, the absorption of an opaque capsule is a somewhat uncertain event. Some authors, indeed, imagine that it is quite incapable of being acted upon in this manner. I do not, however, quite agree with this view, because I have

seen instances in which portions had been brought forward into the anterior chamber, and had disappeared. We know that other fibrous tissues are capable of being removed by absorption, and I do not see why the capsule of the crystalline should not undergo the same process.

*CASE.*—Mrs. H. a married female, about 30 years of age, had lost the vision of her left eye in consequence of a blow received nine years before. A white pearly opacity was seen to block up the pupil, which latter contracted and dilated with the usual regularity. No change was observable in the condition of the iris or any other texture of the eye, and she could readily discern a light or any shining object. The case appeared to be one of capsulo-lenticular cataract, and, at her request, I performed the posterior operation for solution, but on endeavouring to break up the lens, I found that there was nothing but opaque capsule, which was very tough and parchment-like, the lens having evidently undergone absorption soon after the receipt of the injury before named. I then attempted to divide the capsule into fragments, in which I partially succeeded, and then pushed the whole out of the axis of vision, into which, however, it very speedily returned. The moistened extract of belladonna was then applied over the orbit, and the usual antiphlogistic treatment enjoined.

The case went on favourably for the first ten days, but little inflammation resulting, and, there being an aperture in the capsule, she had now regained some degree of vision. At the expiration of this term, however, she began to complain of severe pain in the eye, and, on visiting her, I found that a rather sharp attack of inflammation had come on, and I was also surprised to find that the whole of the opaque capsule had come forward into the anterior chamber, lying irregularly across, and nearly filling it, and that the pupil had contracted upon it. My first impulse was to puncture the cornea and evacuate the irritating body, but the patient was much averse to any further operation, and had been very unmanageable at the first, so that I decided on waiting to see if the opaque body would be acted upon by the aqueous humour and removed by the absorbents. I accordingly contented myself with the employment of leeches, blisters, and the ordinary remedies, with a view of diminishing the inflammatory action in the mean time. These, however, did not seem of much avail, and the pupil remained contracted, notwithstanding the continued use of the belladonna, until a considerable portion of the capsule had disappeared, when the inflammatory symptoms gradually subsided, and the pupil expanded. It was about two months from the time of the capsule passing into the anterior chamber before it had become entirely absorbed. After the inflammatory action had completely subsided, the pupil remained slightly contracted, but clear, and possessing the power of contracting and expanding. No other morbid change was visible, except a slight central opacity of the cornea, the consequence of the inflammatory action having extended to that texture. Vision was imperfect, but appeared to be improving when I last saw the patient.

In performing an operation for division of cataract, both hemispheres of the capsule are, or ought to be, more or less extensively lacerated by the instrument employed. Possessing a certain amount of elasticity, the edges of the wounded capsule recede, and, in many cases, to such an extent as to leave a sufficient aperture for the transmission of light. In other instances, in which the laceration has been less freely effected, the sides of the wound appear to unite again, and often become filled with an opaque deposit, the result of the increased action which commonly supervenes. In this last event, it will be necessary to resort to some operative proceedings, with a view either to make a sufficient opening in the opaque membrane, to lacerate it still further, so as to promote absorption, or to effect its removal by extracting it from the eye.

The two first of these intentions may be fulfilled by the use of a cataract-needle, having a considerable curve at its point. The instrument is to be introduced in the same manner as in the posterior operation for division, the pupil being previously dilated, when practicable, with the belladonna. Sometimes, the needle appears to pass through the texture of the capsule with great facility, and yet without producing any visible breach of continuity. This is, in general, a favourable circumstance, and indicates that absorption will, to a certain extent, take place. At other times, the capsule is carried with the point of the needle into the dissolved vitreous body, and, as soon as the instrument is withdrawn, returns to its original situation behind the iris, to which it is generally adherent at one or more points. In other instances, again, the capsule is divided, and a considerable breach of its texture is effected, and ultimately portions are either absorbed or the divided edges recede towards the ciliary processes, leaving a sufficient aperture behind the pupil. Occasionally, the lacerated portions fall back into the posterior chamber, and float about in the vitreous humour for years without undergoing absorption. This is the case in an individual who occasionally attends at the hospital, and who was operated upon more than thirty years since by Mr. Gibson.

When the capsule is very tough, has a gritty or chalky appearance, and has been a long time the subject of opacity, but little impression will be made upon it by the employment of a needle, and it becomes necessary to resort to the extraction of the opaque body. To effect this, the cornea must be punctured at its outer margin, to the extent of about one-sixth of its circumference; and if the capsule do not follow with the aqueous

humour, a small pair of forceps is to be introduced into the pupil, and the opaque body withdrawn by its agency. Mr. Middlemore has recently invented a small instrument to prevent the necessity of opening the anterior chamber, which is ingeniously contrived to answer the purpose of both needle and forceps, and is introduced, in the form of a broad needle, posterior to the iris. The needle being retracted, the capsule is seized by the forceps, and withdrawn through the perforation of the sclerotica made by the entrance of the needle. Judging from Mr. Middlemore's account, I should be inclined to think that this instrument might be advantageously used in many instances as a substitute for the extraction-knife; but experience alone can decide the question of its general applicability, or otherwise. A similar instrument has also been devised by Mr. Dalrymple. (See Tyrrell's work on the Eye, vol. ii. p. 463.)

In cases in which an opaque condition of the capsule is complicated with closed pupil, it will be necessary to remove a central portion of the iris, as well as the opaque membrane itself, as I before explained when speaking of closed pupil.

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#### SECTION IV.

##### TRAUMATIC, OR ACCIDENTAL CATARACT.

Cataract is not always the result of disordered action from internal causes, since it is not unfrequently produced by injury, applied either directly to the crystalline itself, as in punctured wounds, or by blows inflicted on the external tunics. If the capsule of the crystalline be pricked with a fine, sharp instrument, as a common needle, unaccompanied with displacement or disturbance of the lens, a small opaque spot or line will alone indicate the seat of injury. If the instrument have penetrated deeply into the substance of the crystalline, the probability is that a considerable rent has been made in the capsule, and the lens itself so much damaged that general opacity will be produced, and its structure, to a certain extent, broken up and disorganized. In the first case, vision will be but slightly disturbed, and it is perfectly unnecessary to interfere; but the latter constitutes one of the most important cases to be met with in this department of surgery.

Traumatic cataract is most commonly the result of wounds inflicted by sharp instruments, such as needles, forks, knives, thorns, arrows, and the like. The finer the instrument which has effected the mischief, and the less will usually be the amount of injury to the lens and capsule; and, on the other hand, the more obtuse the agent, the greater will be the extent of laceration of the capsule and disruption of the lens. This latter description of case is also apt to be complicated with extensive injury of the cornea and iris, and sometimes of the deeper-seated textures, as the retina, owing to the concussion attending the injury; and this is more particularly apt to be the case when the mischief has been produced by sharp, angular fragments of stone, an accident which is very common to persons employed in breaking stones on the roads. In this event, the prognosis is unfavourable: but, notwithstanding, very unpromising cases of this character will sometimes terminate more favourably than could be anticipated, and much will depend on the care and judgment of the practitioner.

In the more common case, in which the capsule has been freely lacerated, and the crystalline itself broken up, the cornea and iris not having been materially damaged, the surgeon has to deal with a case precisely similar to that in which the capsule has been designedly pierced, and the lens broken up with the needle, for the cure of cataract by division and absorption. In this case the aqueous humour has obtained access to the lens, the absorbent action has commenced, the lens is softened, becomes of a fluid or pultaceous consistence, and a portion of it frequently passes through the rent of the capsule into the anterior chamber.

*Treatment.*—The treatment of accidental cataract is conducted in two different modes, according to the views entertained by different surgeons. The common method is to allow the natural curative or absorbent process to proceed with but little interference on the part of the surgeon. If there be much inflammation, a few leeches are applied, and mercurials administered, as in a case of internal ophthalmia; the belladonna is also freely applied to the eye-brows and lids, so as to maintain a dilated condition of the pupil. With this treatment, in favourable cases, absorption gradually proceeds, the substance of the lens is removed, and, finally, the pupil becomes clear, with the exception of the capsule, or a considerable portion of it, which requires to be treated as before described, when speaking of secondary capsular cataract. In less favourable cases, it often happens



that a considerable degree of inflammation comes on, which is protracted for a long period of time, and terminates in closed or contracted pupil, the iris and capsule being agglutinated, and the latter converted into a thick, tough, opaque membrane, which is impervious to light.

Bearing in mind the strict analogy which exists between a case of accidental cataract, and that in which the lens has been designedly broken up by the surgeon, we shall see the propriety of following up the practice adopted by Mr. Gibson, of early removing the pulpy or fluid mass of the cataract by extraction, through a small incision, or puncture of the cornea. This method was first employed in these cases, and has been for some years practised, by my able colleague, Mr. Barton, who has published some interesting cases and observations on this subject in the *MEDICAL GAZETTE*, (March 1830.) Mr. Barton's operation is performed in the following manner. The puncture of the cornea is to be made at the temporal margin with the usual extraction-knife, the point of the instrument being carried into the pupil, when the lens will frequently be discharged with the aqueous humour; if it do not escape in this manner, the knife must be withdrawn, and a scoop introduced through the aperture of the cornea into the pupil, when the softened cataract usually passes out with the greatest facility. The after-treatment, and other subsequent proceedings, *e. g.*, the removal of the opaque capsule when necessary, are to be conducted in the manner I before pointed out, when speaking of Mr. Gibson's operation and that for capsular cataract.

It has been urged as an objection to the performance of this operation, that, as there is generally a considerable amount of inflammation present in all cases of cataract induced by injury, such a proceeding shortly after the accident would be likely to add to, rather than diminish the disordered action. This, however, is not found to be the case in practice. On the other hand, the irritation and suffering which in most instances succeed to a laceration of the capsule and breaking up of the lens, will often be materially relieved by the removal of the irritating body from the eye. Such a result I have witnessed in very many instances; and as this is a point of some practical importance, I shall relate a few cases, by way of illustration.

CASE 1.—M. M., about thirty years of age, ten days before I saw her, received a severe injury of the left eye from the sharp end of a bone which had been thrown at her, in a quarrel, by her husband. The upper and inner portion of

the cornea, near its margin, was cut across to the extent of about a quarter of an inch; a considerable portion of the iris protruding through the wound, leaving a very large and irregular pupil at the superior part of the anterior chamber; the lens had also evidently been injured, since it was perfectly opaque and of a milky-white colour, and (probably owing to the escape of the aqueous humour) pressed the iris in almost immediate contact with the cornea. There was, likewise, a considerable degree of excitement about the eye, the vessels of the conjunctiva and sclerótica being very numerous and much distended, as well as an undue amount of lachrymation, intolerance of light, and pain about the eye and head; vision, too, was so much impaired, that she could only discern a very bright light. Having decided upon extracting the opaque lens, I punctured the cornea with the extraction-knife at its outer and lower margin, precisely opposite the wounded part. A considerable portion of the cataract, which was in a semi-fluid state, immediately escaped through the aperture; the scoop was then introduced into the wound and within the pupil, and another portion of lens removed in its concavity, leaving nothing but the opaque capsule behind. The lids were then brought into contact, and maintained in that position by strips of adhesive plaster. Some purgative medicine was ordered to be taken occasionally. When I next saw her, two days afterwards, she expressed herself as perfectly free from pain, and having slept much better than before the operation. In three weeks, the vascularity was all but gone, and there was scarcely any uneasiness about the eye. No other treatment had been resorted to, except the occasional application of the nitrate of silver to the protruded portion of iris, with the effect of removing the projection which it had occasioned. At the end of a few weeks more I again saw her; the eye had been free from irritation for some time; a large opaque cicatrix was observed at the upper and inner part of the cornea, the site of the original wound; the iris was entirely deficient at this point, the pupil occupying its place and filled with opaque capsule, which had a very thin, cobweb-like appearance. In other respects, the eye looked healthy; the cornea, except at the cicatrized point, retaining its transparency, and the remnant of the iris possessing its natural brilliancy. Vision had considerably improved, as she was able to see surrounding objects, indistinctly however. A curved cataract-needle was now passed through the sclerótica into the pupil, and the opaque capsule freely lacerated. In six weeks from this second operation, the capsule still offering a considerable barrier to vision, the cataract-needle was again introduced, with the effect of causing a pretty large opening in the capsule, and the subsequent absorption of so much of it as to afford the patient very useful sight.

After having performed the operation previously described in a considerable number of cases, it occurred to me that the proceedings might be somewhat simplified by the employment of an instrument which should combine the advantages of the extraction-knife with the scoop. I have simply called it a *grooved needle-knife*. The handle is of the same length

as that of an ordinary cataract needle. The instrument itself is about an inch and a half in length, gradually widening from the handle to within about a quarter of an inch of its extremity, when it suddenly tapers off to a fine point. Its greatest breadth is about one eighth of an inch, and from its shoulders to the point it cuts with both edges, so as to perforate the cornea with facility. On one side it is flat and smooth, and on the other grooved almost to its entire length. This instrument was employed with complete success in the following cases.

CASE 2.—Ellis Matley, aged seven, was admitted a patient of the hospital July 2nd, 1845. Four days previously, whilst standing beside his father, who was filing metal, a portion flew off and entered the right eye. He has had considerable pain and irritation about the eye since the accident, and the vision is nearly gone. Much vascularity of the conjunctival and sclerotic coats is present. A small white speck is observed near the centre of the cornea, and on looking into the pupil the lens and capsule are seen to be opaque, and a *fragment of metal is also noticed lying within the capsule and partly embedded in the substance of the lens.* The pupil is rather contracted but obedient to light. The extract of belladonna was ordered to be applied around the eye.

3rd. The pupil is more but not fully dilated. There is no other change in the appearance of the eye. At a consultation it was decided to puncture the cornea and evacuate the opaque lens and metallic fragment. The grooved needle-knife was employed for this purpose, and the broken-up lens and portion of metal, (about three lines long and one broad,) escaped along the groove. The patient was ordered to bed, to continue the belladonna, and to take an aperient.

6th. He has had no pain since the operation; the pupil is well dilated, but there is a considerable portion of capsule behind it; inflammation abated: vision much improved. He was made an out-patient, and ordered to continue the application of the belladonna.

August 7th. The pupil has been kept dilated with the belladonna; about one half of it is filled by the remains of the opaque capsule, which is rapidly diminishing. No inflammation. Vision is very good, being able to read with the assistance of a lens.

In this case the operation was doubly advantageous, inasmuch as it at once removed both the opaque lens and foreign body from the eye. This case is unusually interesting from the fact of the foreign body remaining in view within the capsule of the lens. Cases of foreign bodies wounding the eye are very common, but, generally speaking, they do not lodge within it. This is the only case in which I have observed an extraneous

substance fixed in the lens. I have seen several instances in which it was lodged in the anterior chamber and in contact with the iris.

CASE 3.—W. Redfern, aged ten, from Stockport, admitted October 25, 1845. States that he accidentally wounded his right eye, about six weeks since, with a fine needle. He has not suffered much inconvenience excepting that which arises from loss of vision. There is now no inflammation present; the iris appears not to have been injured; the pupil is perfectly regular and contracts or dilates, according to the varying intensity of the light. The lens and capsule are of an opaque, blueish-white colour; a portion of flocculent lens protrudes into the pupil and partly into the anterior chamber, through the rent in the capsule caused by the passage of the needle. He has no vision; says he cannot see his hand when held before his eye, but can readily discern light from darkness. Ordered to have the extract of belladonna applied around the eye night and morning, and to take an aperient every second or third morning.

30th. The pupil is moderately dilated, but quite blocked up by opaque lens, of which a small portion has completely passed into the anterior chamber. No improvement of vision; no pain or irritation about the eye. The patient having been removed to the operating room, was laid on a sofa with the head elevated. The grooved needle-knife was passed through the cornea, near its outer margin, into the anterior chamber, the point being dipped into the centre of the pupil, when the dissolved lens immediately flowed out along the groove of the instrument, leaving the pupil almost clear. The boy was now able to see distinctly. A belladonna plaster was ordered to be kept constantly on the eye, to be renewed night and morning.

November 1st. There is some inflammation about the eye, but nothing to create uneasiness. The pupil is clear, and he sees fully as well, but cannot bear to use the eye. A small fragment of the lens may be seen at the bottom of the anterior chamber. There is a little pain felt on exposure to light at times, at other times none. Continue the belladonna and aperient.

12th. The pupil continues quite clear; the fragment of lens has disappeared from the anterior chamber; he can bear exposure of the eye without irritation; vision perfect, if a suitable glass be used.

CASE 4.—Peter Smith, aged thirty, a mechanic, from Bury, was admitted an in-patient of the hospital on the 21st of May 1845. Five or six days previously, whilst at work, his left eye was struck with a small piece of steel, which had produced much irritation and complete loss of vision in the organ. Leeches had been applied, and other remedies resorted to without benefit. On examination there was an appearance of extreme vascularity of both conjunctiva and sclerotica; the cornea was but slightly affected, an opaque line, however, being observable at a point near its centre where the fragment of steel had evidently impinged; and on closely inspecting the iris, a corresponding wound in its structure was apparent, precisely opposite the wounded portion of the cornea, so that it was tolerably

evident that the foreign body must have penetrated both cornea and iris, and was probably lodging in the crystalline lens, or somewhere in the posterior chamber; the lens was very opaque and somewhat displaced; the pupil irregular, but not much contracted. He was ordered to have the extract of belladonna applied freely around the eye.

22nd. The only change observed is that the pupil is pretty fully dilated, particularly upwards and outwards; the inner and lower portion of the iris being apparently prevented from expanding by the pressure of the displaced lens, which appears to bulge forward in that direction. At a consultation, it was decided that the cornea should be punctured and the displaced and opaque lens removed. This was accordingly done in the usual way by the grooved needle-knife being passed through the cornea and into the pupil, the aqueous humour and a considerable portion of softened pultaceous lens immediately escaping. After the operation, the pupil was observed to have become considerably contracted and of a more regular shape; vision being improved but very indistinct. He was ordered to go to bed and to continue the use of the belladonna.

23rd. He has passed an excellent night, the best of several; has little or no pain; the vascularity not increased; the pupil appears to be occupied by opaque capsule. To continue the belladonna plaster; and to take a draught of the compound senna mixture occasionally.

31st. Has proceeded very favourably since last report; the vascularity is much diminished; the pupil is still occupied by opaque capsule. He was made an out patient with directions to attend occasionally. To continue the medicines.

In this case, there was no appearance of the foreign body escaping with the dissolved lens, but still it was hoped that it might have done so; or, if remaining in the eye, that it would be eventually removed by the action of the absorbents. The patient went on very well for two or three weeks, when he returned in consequence of a severe attack of inflammation. This was of the character of iritis, as denoted by a change of colour of the iris, a greater amount of contraction of the pupil, effusion of puriform fluid into the anterior chamber, deep-seated pain in the eye, and the usual appearance of vascularity of the outer tunics. This continued for several weeks. It ultimately subsided under the administration of mercurials, leeches, purgatives, and the ordinary antiphlogistic remedies, the pus disappearing from the anterior chamber, but the pupil remaining closely contracted and adherent to the opaque capsule. In a few months afterwards, when he last presented himself, the eye had been free from irritation and he had been regularly attending to his employment. There appeared every reason to suppose ~~then~~, that an artificial pupil might be successfully made,

as probably the foreign body had either become encysted or absorbed ; however, it was not urged upon him and its consideration deferred.

CASE 5.—George Ryle, aged 21, a mechanic, admitted July 30, 1846. He states that whilst at work, a piece of iron flew with great force against his right eye and wounded it very severely. He has had great pain in it since the receipt of the injury, and vision is totally gone. There is great irritability and profuse lachrymation on exposure to light. On looking at the eye, it is evident that the cornea has been cut in a perpendicular direction, right through its central portion, the edges of the wound being slightly uneven and covered with a layer of lymph ; the iris appears to have escaped injury, the pupil being moderately regular but rather contracted ; the capsule and lens are opaque, and a portion of the disorganized lens protrudes through the pupil. The globe is highly vascular. He was ordered to have the saturnine lotion constantly applied during the day, and the extract of belladonna at night ; and to take two pills of calomel and opium (containing two grains of the former to half a grain of the latter) at bed time.

31st. There is but little change in the appearance of the eye. The irritation is excessive ; he is unable to bear the least exposure to light. At a consultation, it was deemed advisable to puncture the cornea and give exit to the broken-up lens. The grooved needle-knife was accordingly introduced at the outer margin of the cornea and its point passed into the pupil. By this operation, a small portion only of the dissolved lens was evacuated along the groove of the instrument, the larger part, in consequence of the pressure, being forced through the wound in the centre of the cornea. This was followed by the immediate restoration of sight. He was then removed to bed, and ordered to continue the belladonna.

August 7th. He has proceeded very favourably since the operation, having been subjected to the usual antiphlogistic treatment, but not requiring any abstraction of blood. The vascularity is almost gone ; the wound of the cornea nearly healed, leaving an opaque line ; the pupil clear and quite free from opaque capsule ; and he can now see distinctly.

A remarkable circumstance in this case, which I have before witnessed, is the protrusion and discharge of the dissolved lens through the wound of the cornea, on the introduction of the instrument into the eye. Another interesting point is the rapid recovery after the removal of the foreign body (the broken up lens), notwithstanding the severe penetrating wound of the cornea, effected too by an obtuse body coming forcibly in contact with the eye. The rapidity of recovery is generally in a tolerably exact ratio to the healthy condition of the patient. If he be of a sound constitution, the eye soon recovers from the effects of the injury when the source

of irritation is removed ; if, on the other hand, he be of a delicate or strumous habit, he will certainly be the subject of a lingering attack of ophthalmia, commonly terminating in deposition of lymph into or across the pupil, and a consequent obliteration of that aperture. This, however, is less likely to be the case when the lens is removed by an early operation. Another important consideration consists in the great saving of time to the patient, a point of much interest to a labouring man. Had this case been allowed to proceed without the extraction of the lens, a long and tedious process of inflammation would have had to be combated, the wound of the cornea would not have healed during the continuance of the inflammatory action, and the patient must have lost many weeks of valuable time. I remember an analogous case in which, on puncturing the cornea, three or four weeks after the receipt of the injury, the dissolved lens was forced through the wound of the cornea, as in the case now reported, so that it was evident that no attempt at reparation had been made in that long period of time.

The following case of cataract from injury is interesting in another point of view :—

CASE.—Louisa S., a delicate looking child, aged 3 years, was brought to me on the 17th of October 1838. It appears that about five weeks since, whilst attempting to sew, she accidentally pricked her right eye with a stocking-needle. For some time afterwards no bad consequence was perceived, and her friends concluded that no injury had been done to the organ ; but in about a fortnight after this the eye became inflamed, watery, and intolerant of light, and assumed a very dim and muddy appearance, which condition has remained up to the period when she was brought to me. She is now usually very drowsy, and appears to have much suffering in the eye, although her health is not otherwise much affected.

On examining the organ, there is considerable vascularity of both conjunctiva and sclerotica perceptible. The iris has a very dull, muddy appearance, the pupil being drawn to the inner angle, transversely oval in shape, motionless, and somewhat dilated. An opaque body is seen behind the pupil, having a yellowish brown colour. The cornea does not exhibit any appearance of disease. The whole eye has a disagreeably dull and unhealthy aspect, so much so as to convey the impression to my mind that the disease might be of a fungoid character. However, on the whole, I was inclined to regard the symptoms as arising from injury of the crystalline lens, which being broken up and pressing against the iris, had produced the inflammation then existing. The irregular form of the pupil—the result probably of the wound of the cornea and iris—rather tended to

confirm this supposition. Four leeches were directed to be applied around the eye-lids, to be followed by the free use of an evaporating lotion. A powder of calomel and rhubarb to be taken every other morning.

October 22nd. The inflammation is somewhat diminished; she is able to expose the organ to the light, but it is still watery; she appears more lively, and suffers less pain. Apply three leeches. Continue the lotion. Two grains of calomel to be taken each night.

November 3rd. The opacity behind the pupil has now a more lustrous and shining appearance, and the idea of a fungoid affection again forcibly presents itself. It certainly exhibits a striking resemblance to it in the bright metallic reflection which is seen in that disease. She appears better in health, is more cheerful, and makes no complaint. There is still considerable vascularity of the outer tunics; but she exposes the eye more freely to the light. A dose of calomel to be given every third or fourth night, with senna infusion on the following morning.

November 7th. Has not exposed the eye so much within the last few days. It presents precisely the same appearance as at last report.

November 26th. The vascularity diminishes, and the eye bears exposure better again. The organ looks more healthy, the shining appearance having vanished, and the opacity behind the pupil now resembles that ordinarily seen after injury of the lens.

December 3rd. The vascularity is much diminished; the eye-ball, it is now evident, is beginning to absorb, being considerably shrunk, and feeling soft on pressure. Bears exposure to the light very well, and makes no complaint.

No further bad symptoms occurred. This case was at first, as well as during its progress, somewhat puzzling. It is easy to conceive that it might have been mistaken for fungoid disease, an operation performed for its removal, and much unnecessary pain occasioned. I was much gratified when the eye put on the appearance of absorbing, having much feared that it would have taken an opposite course. It was quite possible that there might have been incipient fungus previous to the accident, and that the irritation succeeding it might have hurried on the progress of the malady.

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## SECTION V.

### DISLOCATION OF THE LENS.

A severe blow or other injury inflicted on the eye will sometimes cause a displacement of the lens. This may occur in three different directions; *the lens may be thrown backwards into the substance of the vitreous*



humour, forwards into the anterior chamber, and sometimes forced through the sclerotic coat, when it will be found lying between it and the conjunctiva. Instances of each of these forms of displacement are not unfrequently met with. The lens may also be more partially displaced, either upwards, downwards, or laterally. Dislocation of the lens, however, is not always the result of injury. I have seen cases, in which the crystalline had been protruded into the anterior chamber when no accident had occurred, and where the change had been, to all appearance, spontaneous.

*CASE.*—A young girl came under the care of my colleague, Mr. Windsor, in whom both eyes were thus affected. The lens was seen lying in the anterior chamber, its transparency but little diminished, of a bright, gold-coloured tinge, and very much resembling a lump of clear, almost colourless jelly. In this instance, the pupils were dilated and immoveable, considerable inflammation existed, and the usual concomitants, intolerance of light, pain in the organ, and impaired vision, symptoms which were apparently referrible to the irritation caused by the displaced lens. The lenses were extracted, but the mischief engendered had been of too serious a character to be remedied, and the eyes remained perfectly amaurotic.

Other instances of spontaneous dislocation are recorded. In some of these, the lens passed either in front or behind the pupil, according to the position of the head, and did not appear to excite much irritation.

It seems most probable that spontaneous dislocation of the lens can only result from a previous thinning or absorption of the capsule, although some of our best writers appear to think that when the lens retains its transparency the capsule remains entire, otherwise they presume that it would become opaque, and be absorbed when in contact with the aqueous humour. This, however, does not seem a necessary result, except the texture of the lens were also broken up, which, in cases of spontaneous dislocation, we should not expect it to be.

When the lens is protruded either into the anterior chamber or between the sclerotica and conjunctiva, it will usually be proper to remove it from its new position as early as possible, as it will otherwise be sure to excite inflammation, which may lead to a serious impairment of vision. Indeed, the injury which is sufficient to cause displacement of the lens, will very often be productive of other important consequences, as concussion of the retina and severe inflammation of the globe. For the removal of the displaced lens from the anterior chamber, a small incision will alone be re-

quisite: the opening need not extend to more than one-fourth of the circumference of the cornea, when, if it do not readily escape, the introduction of an iris-hook will effect its dislodgment. In one case of dislocation into the anterior chamber, the lens, after extraction, was found completely ossified. It had been several years in its unnatural position, and had either produced or was attended by amaurosis.

If the lens have been forced through the sclerotica, and remain under the conjunctiva, a small incision into the latter tunic will be sufficient for its removal. In one instance which came under my notice, and which was occasioned by a blow, the wound of the sclerotica, through which the lens had been protruded, was scarcely perceptible; the displaced body was easily removed, and was found quite softened and slightly opaque. The nature of the case was indicated by the injury, and by the size, shape, and consistence of the foreign body under the conjunctiva, and confirmed on its removal.

If the lens be displaced into the posterior chamber, it had probably better not be interfered with, except it be opaque, and its removal seem likely to cause a restoration of vision; but even then it would be advisable merely to depress it, because the vitreous humour would most likely be disorganized.

CASE.—W. B., aged 50, applied at the hospital on account of some uneasiness in his right eye, the sight of which he lost upwards of twenty years before by an accident. The conjunctiva, both palpebral and ocular, was much injected: there was also a great discharge of mucus, the margins of the lids frequently adhering. He attributed the attack to exposure to cold. On looking into the eye, an opaque and apparently solid crystalline was seen lying obliquely across the pupil, which was excessively dilated. One portion of the circumference of the crystalline was almost in contact with the cornea at its inner margin, but the latter portion was lodged in the posterior chamber. The iris was excessively tremulous, and the vitreous humour evidently fluid, for the least motion of the eye caused the lens, iris, and humours to be in a state of oscillation. The eye was perfectly amaurotic. He had not been subject to inflammation, and usually suffered no inconvenience from this condition of the eye; and as the present attack was evidently *catarrhal*, it was not deemed advisable to interfere in the way of operation. He was ordered a saturnine lotion and purgative medicine, under which treatment the inflammatory action speedily subsided.

It is worthy of remark, that the extraction of a displaced lens from the anterior chamber gave rise to the systematic extraction of cataract by

incision of the cornea. Daviel, a French surgeon, took the hint from Petit, who, in 1708, punctured the cornea for the evacuation of a displaced and opaque lens.

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## SECTION VI.

### CONGENITAL IMPERFECTIONS OF THE CRYSTALLINE.

In some rare instances, the lens has been found entirely deficient at birth, in others partially so. It has also been found of very irregular shapes; sometimes of a triangular form. A double lens has likewise been observed, with a corresponding double pupil. But the most frequent deviation from the normal state is congenital opacity of the lens and its capsule.

### CONGENITAL CATARACT.

This subject, however, requires but little separate consideration. When a child is born with cataract, it is, in general, readily ascertained by the milky white opacity of the pupil, and the peculiar searching motion of the eyes. An operation alone can be of service in this case, and all that is needed is to employ the needle in the manner previously directed, when speaking of the operation for division of cataract. This operation may be resorted to with the utmost safety at a very early age: I should say that from the age of from three to six or eight months, before the period of painful dentition ordinarily arises, would be the most suitable, when we see the patient sufficiently early to make a choice. These cases, when uncomplicated with any other affection, are generally very successful. The lens and capsule, particularly the former, usually undergo absorption with great rapidity, and when the operation is early resorted to, and care be taken to lacerate the capsule sufficiently, there is seldom any danger of secondary cataract resulting. In performing the operation on infants or children they should be laid on a table, with a soft pillow for the head to rest upon: *assistants* are necessary to steady the head and body, and a *speculum* is *sometimes* required to elevate the superior lid, whilst the lower is depressed.

by the finger. The operation of breaking up the cataract in infants was first resorted to systematically by Messrs. Gibson and Saunders. The after-treatment in these cases is usually very simple, the inflammation being seldom very active. The employment of belladonna, so as to keep the pupil well dilated, and ordinary antiphlogistic remedies, are generally sufficient to subdue any inflammatory action which may be set up. Absorption usually proceeds rapidly, but the capsule often requires to be again subjected to the needle operation in a few weeks after the lens has been broken up.

CASE 1.—Martha W., aged twelve months, had been blind from birth, not having at any time appeared to notice any object whatever, although she frequently directed her eyes in a fixed manner towards the window or any strong light. The eyes had latterly acquired a somewhat rolling, unsteady movement, and there was a slight degree of internal strabismus of the right. They possessed a generally healthy aspect, were well formed, and the pupils were active. On looking into the pupils, however, there was distinct evidence of an opaque condition of the lens and capsule, which were perfectly white. Her general health was very good.

July 23rd, 1841. Belladonna had been applied, and the pupils were fully dilated, so that the cataracts were completely exposed. The child having been properly secured on a table, the head placed on a pillow, and the lower lid depressed by an assistant, I raised the upper lid, introduced a straight needle into the posterior chamber, and freely broke up the cataract, first in the right and then in the left eye, without change of position. Extract of belladonna, moistened to a proper consistence, was ordered to be kept upon the eyes, which were also directed to be covered with a slight bandage passed around the head.

26th. There had been scarcely any inflammation in either eye since the operation; slight ecchymosis of the right from effusion of blood under the conjunctiva; the pupils were well dilated, and the cataracts, particularly that of the right eye, rapidly absorbing, a considerable aperture being visible in each.

30th. The right pupil was perfectly clear, but the left was still occupied with opaque capsule.

October 5th. A portion of opaque capsule was still observed stretching across the pupil of the left eye. The child having suffered from an attack of bowel-complaint, the repetition of the operation had been postponed. Health had now become re-established; the belladonna had been applied last night, and renewed this morning. The pupil was well dilated, the needle was therefore introduced as before, and the capsule freely lacerated.

October 7th. Scarcely any inflammation had resulted; the pupil had been kept dilated by belladonna and was almost clear, with the exception of a small portion of its outer margin.

December 20th. Both pupils were perfectly active and free from any opaque membrane. The eyes had still somewhat of the rolling motion and the strabismus continued, but there was evidently a fair amount of vision and the case was altogether very promising.

CASE 2.—John L., aged four months, was observed to have very defective sight very soon after birth, not appearing to notice any object except some luminous body, as a lighted candle or the fire. The pupils were very active, the eyes well developed and had a healthy aspect, except that there was an evident milk-white opacity of the lens or capsule. The general health was very good.

October 28th, 1841. The chances of an operation (having been previously explained to the parents, (both of whom were unfortunately also blind, from the effects of severe inflammation,) they were desirous that the child should be subjected to it. The pupils being well dilated, from the use of, belladonna, the little patient was placed on a table, with the head resting on a soft cushion. The head and body being firmly secured, and the lower lid depressed by an assistant, I placed myself at the head of the patient and raised the upper lid, first of the right and afterwards of the left eye. A straight needle was employed to perforate the sclerotics, at a short distance posterior to the corneo-sclerotic junction, the point of which being brought into the pupil and in front of the opaque body, was then depressed and freely passed through the substance of the cataract. The same process was then repeated on the other eye. The cataracts appeared to consist of little more than capsule, and were easily perforated, the right being somewhat firmer than the left. Belladonna plasters were then applied in the usual manner.

October 30th. No inflammation appeared in either eye. A considerable aperture was seen in the cataract of the left, which was evidently becoming rapidly absorbed; in the right eye the change was less marked, although the absorption process had clearly commenced; the child had been apparently quite free from pain since shortly after the operation. Belladonna was directed to be applied every night, and a purgative to be administered occasionally.

November 2nd. It was evident that he takes more notice of surrounding objects; absorption was also proceeding rapidly, and everything was highly favourable.

December 13th. A portion of capsule was still seen stretching across the pupil of each eye, so that when the latter is contracted, there is but little space for the admission of light; the portion of capsule larger in the right than in the left eye; vision evidently much improved. There having been no appearance of absorption proceeding during the last few weeks, it seemed desirable to re-introduce the needle so as to lacerate and displace the remaining portions of capsule. The belladonna having been efficiently employed, the operation was repeated on both eyes with the almost immediate effect of rendering the pupils nearly clear, the capsules having been freely lacerated and removed from the axis of vision. Belladonna was ordered to be kept constantly applied as usual.

January 3rd, 1842. No inconvenience resulted from the last operation; sight was much improved as the child eagerly noticed and grasped at every thing held before him; the pupils were clear, except that at the outer margin of that of the right eye there was a very small portion of capsule visible, but which, it was evident, could not interfere with vision and would, most probably, entirely disappear in a short time.

There appears an obvious advantage in operating on children, affected with congenital cataract, at a very early age, inasmuch as, if delayed even a few months, the peculiar oscillatory movement, so constantly seen in persons born blind, is almost sure to become established,—a condition which is very difficult to conquer, and which there is reason to believe is an impediment to vision. Strabismus is also less likely to come on when the operation is early resorted to. The absence of both these phenomena in the case last given, renders it an interesting contrast to the preceding one. The following case will show that cataract in infants is not always congenital.

CASE.—Wm., B., aged 7 months, was admitted an out-patient of the Manchester Eye Hospital, June 20th, 1841. About a month previously, the parents noticed something wrong about the appearance of the right eye, which they were confident had not been before visible. On looking into the pupil, a white pearly opacity was observed in the situation of the lens, which was evidently of the nature of cataract. The eye, in other respects was perfectly healthy, the pupil being very active. This eye had never been the subject of injury, nor was there any mark of a wound such as might have been inflicted by a needle or other sharp instrument. The pupil having been dilated by belladonna, the opacity had all the appearance of being seated in the substance of the lens, having a blueish white colour, and being somewhat removed from the posterior surface of the iris. The other eye was perfectly free from disease, and its vision unimpaired.

July 10th. The pupil having been well dilated by belladonna, the posterior needle operation was performed in the usual manner. Moistened extract of belladonna was ordered to be kept constantly applied, and a light bandage passed over the eye and around the head.

13th. Scarcely any inflammation had resulted; there was a slight degree of ecchymosis under the conjunctiva, at the point where the needle had perforated the globe; the pupil was well dilated, and there was but little change in the appearance of the cataract. The belladonna was ordered to be continued, and a mild purgative administered occasionally.

August 28th. There was nothing of the cataract perceptible but the opaque capsule, which, however, completely occupies the pupil. The pupil having been

previously dilated, the needle was again introduced and the capsule freely lacerated and displaced. The belladonna was applied as usual.

November 10th. There was no perceptible difference in the appearance of the two eyes, the pupil of the right being as clear, active, and regular as that of the other. The parents were satisfied that vision has been restored to the affected eye.

The case, above related, is interesting from the circumstance of the cataract being confined to one eye, which it rarely is in infants, and from its becoming developed at such an early age. Congenital cataract almost invariably affects both eyes; and the fact of the disease being, in this instance confined to one, is probably sufficient proof that it was not congenital.

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## SECTION VII.

### SELECTION OF AN OPERATION FOR CATARACT.

It, perhaps, may not be out of place, before quitting the subject of cataract, to give a general summary of the reasons which should guide us in selecting a particular operation for each case that may arise.

From the observations I have previously made, the reader will understand that it would be highly culpable to attempt to cure cataract by the performance of one particular operation, under every circumstance, and in every description of case. Ample experience and careful observation can alone enable an operator, on all occasions, to decide what operation is best suited for every individual case that may come under his notice. Some surgeons entertain a very decided preference for one particular operation, although they occasionally deviate from strict rule; and it is a very difficult matter to give a perfectly unprejudiced opinion of the relative merits of the different operations in the abstract, some thinking very highly of the operation of extraction, and others that depression or division are fairly entitled to supersede the others. It is perfectly clear, however, that he who wishes to succeed well as an operator must take care to qualify himself for the performance of the various operations, otherwise his judgment will be liable to be biassed by his inclination, and he will be apt rather to select that which is most easy of execution, than the one best adapted to the case in hand.

The accumulated experience of the majority of those surgeons who have given considerable attention to the subject, has resulted in a decided conviction that each of the operations before mentioned ought to be practised under certain circumstances, the leading outline of which I will briefly detail.

*The case for extraction* is that of a person somewhat advanced in years, because in him the cataract is generally firm, and if it were depressed or divided would probably excite irritation in the interior of the eye, and its absorption would be a matter of considerable doubt. For the safe and easy performance of extraction, it is necessary that there be a tolerable space between the iris and cornea, so that the knife may pass through the anterior chamber without injury to the former. The pupil should likewise be capable of contracting and dilating in an active manner, the eye tolerably prominent, retaining its natural firmness, and exhibiting no indication of any disease posterior to the lens. The advantage of extraction is, that when successfully performed, the cure is rapid and complete, and no portion of the eye is injured except the cornea. But, on the other hand, it is generally thought that there is greater risk of inflammation after so extensive a wound; the healing process may not go on favourably; sloughing or ulceration may occur, and there may be an extensive prolapse of the iris and staphyloma. These are the most frequent occurrences that endanger the success of the operation of extraction. In some rare instances, suppuration of the eye-ball has succeeded, and I have even heard of death having resulted from the extension of the inflammatory action to the brain. Extraordinary cases, however, of this description are not to be regarded in the general performance of our duties; otherwise, because persons have been known to die of phlebitis after venesection, we might object to the simplest of all operations.

*The case for depression* is also an individual of a somewhat advanced age, and the cataract of firm consistence. This operation, according to the prevailing opinion, ought only to be resorted to when some serious impediment is opposed to the successful employment of extraction, as when the cornea is very flat, or the iris very convex, so as to form a very small anterior chamber; the pupil much contracted or fixed, from adhesion between the iris and capsule of the lens; the eye-ball much sunk in the orbit, or the aperture between the palpebræ unusually small; or when there is reason to believe that the vitreous body is preternaturally fluid,



as indicated by a deficient firmness in the globe of the eye, or a vacillatory, tremulous condition of the iris. The advantages of depression are, the small amount of skill necessary to its performance, the little pain or risk attending the operation, and when successful the immediate restoration of vision. The disadvantages are, the tendency of the lens to rise again into the pupil, the liability to internal inflammation being excited by the hard lens, and the danger of amaurosis supervening; and it appears that so much mischief may result even from depression, as to occasion death; an instance of which is related by Mr. Cleobury.

*The case for division* of the cataract is when the patient is young, the cataract soft or fluid, and the eye in other respects healthy. The advantages of the operation of division consist in its facility of execution, and the comparative absence of injury inflicted on the eye at the time of operating. Its disadvantages are, the tedious nature of the process of absorption, the risk of iritis and closed pupil, and the danger of the eye becoming atrophic, after the excessive and long-continued action of the absorbents, requisite for the removal of the opaque body. These results, however, as I before explained, may in many cases be prevented, by the timely extraction of the disorganized lens soon after the operation of division.

On the whole, from the tenor of the preceding remarks, based upon careful observation and some experience, and regarding the result of the individual case, if the operation be skilfully and efficiently performed, as less dependent upon the particular operation than the peculiar constitution of the patient, I should be disposed rigidly to follow up the line of practice inculcated. In a case of hard cataract, if no very formidable obstacle presented itself, I should prefer extraction, believing, as I do, that no greater risk of inflammation and its consequences, would be incurred by that mode of operating than by leaving it in the eye. After extraction, if well done, the principal risk is immediate; but, after depression or division, there is no certainty when the patient may be pronounced safe, for a foreign body continually lodging within the eye, may at any time excite inflammation, and seriously impair or even destroy vision. It is quite evident, too, that but little satisfaction will be afforded to the patient by the information that his eye was destroyed by the gentlest possible means; or to the surgeon to know that it was lost by internal ophthalmia or atrophy, instead of acute external inflammation or sloughing: the former is a somewhat slower process than the latter, but both may be equally

fatal to vision. Moreover, it is a generally admitted fact, that a very superior degree of vision is usually attained after extraction than after depression or division; and it is also found that the sight is more apt to fail after a given period, when the latter operations have been performed, than when extraction has been resorted to. Some interesting cases have been recorded by Mr. Cleobury, in which he performed extraction in one eye and couching in the other; the result uniformly being, that the eye from which the cataract had been extracted possessed much better vision than that in which it had been merely depressed.

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## SECTION VIII.

### SPONTANEOUS ABSORPTION OF THE CRYSTALLINE.

Extraordinary cases are occasionally observed in which the lens disappears spontaneously, by the action of the absorbents. A case of this description is related by Mr. Estlin, of Bristol.

CASES.—The patient had a cataract in each eye, extraction having been successfully resorted to in one: some time afterwards, the other eye was attacked with inflammation, on the subsidence of which the cataract was found to have undergone the process of absorption, and vision had been restored. I have myself, also, witnessed an instance of this spontaneous disappearance of cataract; the patient was a poor woman who had cataract of both eyes; when she first applied for relief she was in a delicate state of health, and it was not thought advisable to operate. Some time afterwards, however, it was found that vision had been restored to one eye, and it was evident that the opaque lens had become absorbed; the other eye remained in the same condition at the time when I saw her. The surgeon, who had attended and watched the progress of the case, pointed it out to me as one of spontaneous absorption of cataract, in which view I could not but coincide.

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## SECTION IX.

### REPRODUCTION OF THE CRYSTALLINE.

Cases of regeneration of the lens, after extraction, have also been reported. These, however, are extraordinary cases; as, usually, when the lens has been removed, it is not reproduced. Mr. Middlemore has made

some interesting experiments in relation to this subject on very young animals, and he found that if the capsule was freely lacerated, no attempt at reproduction followed; but if he "divided the capsule by a short, clean incision nearly half way across it, and then pressed out the soft lens, a new lens was generally formed."

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## SECTION X.

### ARTIFICIAL LENSES.

Seeing, then, that reproduction of the lens is an occurrence so extremely rare as not to be anticipated, it becomes necessary, in some measure, to supply the deficiency which its removal, by operation, occasions. This can only be effected by the use of powerfully magnifying or double convex glasses, worn before the eyes as spectacles. Glasses of two and a half inches focus are generally found suitable for reading or looking at minute objects, whilst such as have a focal distance of four and a half inches are found to be most useful for viewing distant objects; so that patients usually require two different sets of glasses, one for near and the other for distant objects. The latter are usually of sufficient refractive power to commence with for most purposes, but after a time it becomes necessary to resort to such as possess a greater refractive power. It is very desirable that the patient should not commence the use of spectacles until after the lapse of a few months, in order to prevent the irritation, which they generally produce at first, from interfering with the process of recovery, and in order that he may ascertain how far the unassisted eye will answer the purposes of vision, which can scarcely be known at first.

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### DISEASES OF THE VITREOUS BODY.

*Synchisis Oculi*.—The only disease to which the vitreous body appears to be obnoxious is that to which the term synchisis is applied. In this affection, the hyaloid membrane has been absorbed, the vitreous fluid is of the consistence of water, and frequently diminished in quantity, so as to impart to the globe a soft, unresisting, boggy feel, as if its coats were not completely distended. Very often, all the internal structures are also

more or less disorganized, the crystalline body and the iris floating about in the vitreous humour. This condition is usually the result of long-continued inflammatory action of the internal textures, and is incapable of being remedied.

Sometimes the vitreous humour undergoes a change of an opposite character, and is converted into a more solid substance, resembling boiled rice, or other glutinous matter, in density and opacity. It is a condition which is very rarely met with, and although sometimes resembling a malignant disease, is usually harmless, except so far as vision is concerned.

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#### DISEASES OF THE AQUEOUS HUMOUR AND CAPSULE.

The capsule of the aqueous humour is occasionally the seat of inflammatory action. This, however, I have already described with the diseases of the cornea, under the designation of *aquo-capsulitis*. Occasionally, the secretion of the aqueous humour is so great, and the anterior chamber is so much enlarged, as to constitute the disease, termed *dropsy of the anterior chamber*; but, as I shall treat of the subject of hydrophthalmia generally in the next chapter, it will be needless to discuss it farther at present.

*Animalculæ* are occasionally noticed inhabiting the anterior chamber and floating about in the aqueous humour. In one case, related by Soemmerring, an hydatid (*cysticercus cellulosæ*) attained the size of a pea. It was removed by puncturing the cornea. In another case, Dr. Robertson, of Edinburgh, made an incision into the cornea, and removed the hydatid. Unfortunately, the patient was so unruly that the lens was also evacuated, and the eye so much injured that vision was nearly destroyed. Several of a smaller species (*filaria*) have also occasionally been observed. They are very unfrequent in the human eye, but are often observed in the horse.

## CHAPTER VIII.

## DISEASES OF THE GLOBE.

IN the preceding pages, we have been occupied with the various diseased conditions of the individual textures of the eye, first describing the morbid states of the external tunics, and frequently pointing out the fact, that all those textures, the conjunctiva, cornea, and sclerotica, are, in many instances, simultaneously affected with inflammation. This condition is separately described by some authors under the denomination of *external ophthalmia*. So, also, it was remarked, that, in many cases, the internal textures, the iris, choroid, retina, and capsule of the lens, are at the same time affected with inflammation; and this latter condition has also been separately described as *internal ophthalmia*. Having already given an ample account of these morbid conditions, both separately and in combination, it is not my intention to repeat the statements formerly made. I shall, therefore, pass on to the consideration of an important affection, which is occasionally met with, in which both the external and internal textures are, at the same time, the subject of inflammatory action

## SECTION I.

## OPHTHALMITIS.

When the whole or the greater portion of the tunics of the globe are affected with acute inflammation, it is technically named ophthalmitis.

*Symptoms.*—In this condition, the symptoms common to external inflammation, such as acute conjunctivitis, with chemosis, intolerance of light, lachrymation, redness and tumefaction of the palpebræ, and opacity or even ulceration of the cornea, are accompanied with muddiness and

discoloration of the iris, contracted pupil, effusion of pus into the chambers, deep-seated pulsating pain in the eye, flashes of light, and great disturbance or even destruction of vision. In many cases, too, the cellular membrane of the orbit is much distended with effused fluid, and the eye is pushed forwards so as to occasion a degree of exophthalmia or protrusion. Under these circumstances, there is frequently great constitutional disturbance, fever, headache, and sometimes delirium.

*Treatment.*—This case constitutes one of the most severe and dangerous affections to which the eye is subject; and if the morbid action be not speedily arrested, there is reason to fear not only that vision will be destroyed, from the great tendency to suppuration, but that the organ will be permanently disfigured, and rendered either staphylomatous or become absorbed. On this account the treatment should be extremely energetic. I should say, that, if there be one disease of the eye which especially demands rigid antiphlogistic treatment, including free venesection and nauseating doses of tartar-emetic, it is assuredly this. After blood has been drawn from the arm to as great an extent as circumstances will allow, we must direct the application of a large number of leeches to the outer surface of the palpebræ, to be followed, if necessary, by cupping either the temple or the nape of the neck. Tartar-emetic, in one quarter of a grain doses, should be given every two or three hours until the system is sufficiently reduced; and mercury should be subsequently administered, with a view to arrest the progress of the mischief internally.

This is the kind of treatment to be adopted, modified according to the peculiarities of the case, if we see the patient in an early stage of the disease. If this opportunity be afforded us, we shall be pretty sure to save the eye from disorganization, although it may not be in our power to prevent vision from becoming seriously impaired. But it will not unfrequently happen, if the disease have become fairly established, and particularly if we have not seen the case at an early period of its progress, that no treatment will be of any avail; either the cornea becomes extensively opaque and the pupil obliterated, or, more commonly, suppuration takes place in the interior of the eye, and our remedies are useless.

*Diagnosis.*—As this disease is sometimes mistaken for *purulent ophthalmia*, and as its treatment is so essentially different, I shall make a few remarks on the diagnostic features of the two affections. There is a considerable resemblance in the external appearance of the eye in each;

the tumefaction and redness of the palpebræ, the inflammatory condition of the conjunctiva and cornea, the state of chemosis, and the intense pain are common to each. But, in the purulent ophthalmia, there is always the one striking symptom which distinguishes it from every other affection, viz., the profuse muco-purulent discharge from the surface of the conjunctiva: this is never witnessed in ophthalmitis to any extent, although I do not assert that there is never any muco-purulent secretion in the latter affection, for sometimes a slight appearance of this kind does exist. Again, in purulent ophthalmia, the internal textures are never affected with inflammation, and consequently effusion of pus within the globe is never witnessed. The matter in purulent ophthalmia is secreted from the conjunctival surface; whilst in general inflammation of the globe, the pus is the result of morbid secretion within the chambers of the eye. When the cornea ulcerates in purulent ophthalmia, there is nothing discharged from the eye but the humours; when the same event occurs in ophthalmitis, pus is evacuated as well as the humours.

The proper discrimination of these two affections then is not a mere matter of curiosity, but one of considerable practical importance. It appears to me that the advocates of the antiphlogistic treatment of purulent ophthalmia always argue upon the presumption that they are dealing with a case much more resembling acute inflammation of the globe than one of conjunctivitis, which purulent ophthalmia is; and, as I before remarked, the use of the term suppurative inflammation of the eye, which is sometimes applied to purulent ophthalmia, but which would be more correctly applied to ophthalmitis, has a direct tendency to maintain the error. So that, in order to be correct as respects treatment, it is important properly to discriminate between the two affections, since the employment of the stimulant treatment in a case of ophthalmitis, or the antiphlogistic in one of purulent ophthalmia, would be equally adverse to the benefit of the patient.

Many cases of ophthalmitis, which have come under my notice, have happened in persons who had been the subject of some severe disease or injury of the eye at a former period. In these cases, probably, the diseased action had been originally of the character of which we are now speaking, for there has generally been a densely opaque cornea, with an obliteration, to all appearance, of the anterior chamber, and total loss of sight; or the lens has been opaque, of a greenish or yellowish colour, with

the capsule adherent to the iris ; and the latter structure much altered in colour, and motionless, also with complete loss of vision. In this description of case, we are not so anxious about the result, as vision is already lost ; but the same mode of treatment should be resorted to in order to relieve the suffering of the patient. In some instances, where the attack is less violent, and the suppurative process not established, the disease having come on repeatedly, it may be advisable to excise a portion of the cornea and evacuate the humours, with a view to prevent a renewal of the attack in future, and to avert the danger of sympathetic inflammation of the sound eye coming on.

Ophthalmitis is most frequently witnessed after injuries inflicted on the eye ; it is also occasionally a sequel of some of the more serious operations such as that for staphyloma, extraction of cataract, and the like. When it occurs, under these circumstances, I think there is generally some faulty condition of the constitution which predisposes to it.

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## SECTION II.

### SUPPURATION OF THE GLOBE.

Secretion of pus, as we have seen, is a very frequent termination of acute inflammation of the globe. When matter forms in the interior of the eye, as a result of the severe disease which I have just described, there is not that instantaneous relief experienced which so often follows that process in other textures of the body. On the contrary, if much pus be secreted, we may anticipate, from the unyielding nature of the external tunics, that the sense of distention and bursting will rather increase than diminish ; and it must be the business of the surgeon to make a free incision in the cornea or sclerotica, so soon as the suppurative process is fairly established, which is usually known by the appearance of matter passing through the pupil into the anterior chamber, if the cornea be sufficiently transparent, to allow of its being seen. If an opening be not made for the escape of the matter, some time will elapse before a sufficient amount



of ulceration of the cornea or sclerótica takes place, and the patient's sufferings will be materially prolonged. Anodyne fomentations and poultices should also be freely employed both before and after the puncture has been made; and it will be also proper to administer opium internally, in order to sooth and tranquillize the system. After suppuration, the eye-ball usually sinks back into the orbit, its tunics becoming collapsed, and reduced to a mere tubercle in size.

It is a matter of some importance carefully to discriminate between a case of genuine suppuration of the eye-ball, and a somewhat analogous condition; viz., the secretion of purulent matter into the anterior chamber, the state termed *hypopion*. In this latter condition, as I before stated, it is quite unnecessary to interfere; while in the former, considerable relief may be obtained by evacuating the matter, and no injury result. In a case of hypopion, if we should decide upon opening the anterior chamber, it must be done with the utmost caution, in order to avoid injuring the iris or lens; but, in suppuration of the globe, a tolerably free incision, so as to evacuate the fluid contents, will be most likely to be beneficial.

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### SECTION III.

#### HYDROPTHALMIA.

Dropsy of the eye-ball is not unfrequently witnessed. In a case of this description, the globe is much increased in size, the humours exist in much greater quantity, particularly that of the posterior chamber, which is converted into a thin, watery fluid, the hyaloid membrane being absorbed, and there is usually considerable pain and irritation from the distension of the tunics. Sometimes the globe is so much distended and enlarged, as to cause considerable irritation of the palpebræ, pushing them before it, and often protruding between them, and out of the boundary of the orbit: there is frequently, also, much congestion of the conjunctiva, and effusion *into the cellular texture* beneath.

*The posterior chamber is more frequently affected with this disease than*

the anterior, but both are occasionally implicated. Vision is early impaired and often destroyed in cases of hydrophthalmia, possibly from the increased pressure to which the retina is subjected, but more probably from the diseased action, which has given rise to the accumulation of fluid, having extended to that tunic. For the same reason, the iris becomes paralyzed, and the pupil either sluggish in its movements or dilated and motionless. Of the pathology of hydrophthalmia, however, there is but little that is satisfactory that can be stated.

If the anterior chamber be the principal seat of the affection, the iris is usually pushed backwards against the capsule of the crystalline; but if it be confined to the posterior chamber, then the iris bulges forwards against the internal surface of the cornea, and the anterior chamber is almost or altogether annihilated. In some instances, the cornea becomes opaque, either from the pressure or from some morbid condition of its lining membrane, or some other portion of its texture; but generally there is no loss of its transparency, or of that of the humours.

*Treatment.*—The treatment of hydrophthalmia, in its early stage, is to be conducted on the supposition that the accumulation of fluid is the result of some slow inflammatory action of the internal textures of the eye; and hence topical bleeding, either by cupping or leeching, with counter-irritation, the internal administration of mercury, and general antiphlogistic remedies, are to be recommended. If the globe continue to enlarge, notwithstanding the treatment advised, vision being destroyed, and the patient's sufferings considerable, it will be proper to attempt to relieve the distension by puncturing the eye and evacuating a portion of the fluid. This, however, is usually of but temporary service, and in many cases requires to be frequently repeated. I have known instances in which, after this had been done three or four times, the globe had been much reduced in size, and the patient experienced no further irritation. The puncture may be made either through the cornea or sclerotica, according as the anterior or posterior chamber is most affected. The best instrument for the purpose is the cornea-knife. If this operation, after repeating it a few times, be not successful in reducing the size of the globe, considerable irritation still existing, and vision being irrecoverably lost, then it will be better to perform the same operation as for staphyloma, viz., to excise a small portion of the cornea, so as to allow of the entire evacuation of the globe, and the subsequent partial absorption of its tunics.

Mr. Ware and other writers mention, that, in some cases of dropsy of the posterior chamber, the fluid has been situated between the choroid and retina, the latter membrane being displaced and collapsed, and the vitreous body absorbed. Less frequently, the fluid has been found between the sclerotica and choroid tunics, and sometimes between the sclerotica and conjunctiva.

CASE.—A labouring man presented himself at the hospital, in whom there was a considerable quantity of fluid collected between the conjunctiva and sclerotica, forming a tumour of some size all around the front of the globe, constituting a case of *hydrophthalmia externa*. In this instance the eye had been previously lost by an accident, the cornea had become opaque, and the eye-ball much shrunk; but the presence of this watery swelling gave to the eye the appearance of being more prominent than natural. The fluid, which was contained in three or four separate compartments, apparently communicating with each other, was evacuated by a puncture, but speedily collected again; afterwards the conjunctiva was dissected off, and no further secretion of the fluid took place.

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#### SECTION IV.

##### EXOPHTHALMIA, OR PROPTOSIS.

The condition of the eye, denoted by the term *exophthalmia*, (which means a protrusion of the globe from the cavity of the orbit,) cannot be regarded as a disease in itself, but simply a result of some other morbid condition. A certain amount of protrusion takes place in bad cases of staphyloma and hydrophthalmia. In these cases, it rarely happens that the eye-ball protrudes so much, but that it is covered by the lids, which retain the power of contracting and expanding. In cases of fungus hæmatodes and other malignant diseases of the orbit, the eye-ball is often pushed out to an enormous extent, giving to the patient a very hideous, frightful appearance. In this event, the eye-lids are usually paralyzed, and, with the conjunctiva, pushed forwards in front of the eye, and are of course much enlarged and distended from the pressure. Inflammation of the cellular membrane of the orbit, especially when attended with effusion, may also give rise to a considerable amount of protrusion.

Instances of *dislocation of the globe* have also been recorded, as resulting from injury, in which gentle pressure was effectual in returning the displaced organ into the orbit.

## SECTION V.

## HEMOPHTHALMIA.

Effusion of blood into the chambers of the eye is not unfrequently observed. The term *apoplexy* of the eye has been somewhat fantastically applied to this condition. When blood is effused into the anterior chamber, it is generally the result of blows or other injury to the eye, but sometimes arises from increased action of the vessels in chronic iritis.

As in the case of effusion of lymph or pus (*hypopion*) it becomes, after a time, absorbed; but, while it is present to any considerable extent, it is impossible to see much of the iris or pupil, and of course vision is suspended. When unaccompanied by any other injury, sight will be restored after the absorption of the effused blood. Hæmorrhage into the posterior chamber is generally more serious, as it indicates a greater amount of injury, and probably a rupture of the vessels of the ciliary body, and is less likely to be removed by absorption.

The following case of hæmorrhage from the eye occurred in my practice within a recent period. I do not remember to have met with an account of any case resembling it. I have certainly never seen any other corresponding to it, and conclude that it must be of very rare occurrence.

**CASE.**—Mr. J., about sixty years of age, consulted me in the spring of 1843 for an amaurotic affection of one eye, the vision of which gradually failed, notwithstanding the employment of the usual remedies, until it was completely lost. During the progress of the affection, there was a reddish colour observed behind the pupil, which evidently resulted from effusion of blood into the posterior chamber. I saw him occasionally during a period of about two months, and at the expiration of that time, thinking no good would result from further treatment, he paid no further attention to it. About the same time next year, he again applied to me under the following circumstances. The eye had continued

completely amaurotic since the period of my former attendance on him, but there had been little or no irritation about it until within a few days previous to my seeing him. At this time (April 18th 1844.) he was much alarmed by a rather copious hæmorrhage from the eye, which came on suddenly on his first awaking in the morning. As he lived ten miles off, he determined on starting immediately for Manchester in order to consult me on the treatment to be adopted, and when I saw him in the course of the day at the house of a relative, the bleeding still continued, dropping from the eye so as to form a large coagulum on the floor. He had then certainly lost not less than a pound of blood from the eye. There was considerable vascularity of the external tunics, and the cornea was in a state of ulceration near its centre. The bleeding was seen to proceed through the ulcer of the cornea from the interior of the eye. The cornea and iris were in contact, owing to the escape of the aqueous humour. There was considerable pain felt around the orbital region. He had generally enjoyed good health, but within the last two or three years had suffered considerably from tic douloureux. All circumstances considered, I felt some apprehension as to the result, imagining that some fungoid tumour had, by pressing forwards, occasioned the ulceration of the cornea and the consequent external bleeding. I therefore gave a guarded prognosis and prescribed a lotion, containing the liquor opii sedativus, as an external application, and small doses of calomel and opium, in the form of a pill, internally. He remained in town about a fortnight. Under this treatment, the bleeding gradually stopped, the ulcer of the cornea healed, and all irritation about the eye ceased. No enlargement or protrusion of the eye-ball took place, and he had no further trouble from this source. I have since learned, however, that he died, in the following year, from some internal affection, whose exact nature I could not ascertain.

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## SECTION VI.

### VARICOSE OPHTHALMIA.

Another morbid condition of the eye is sometimes described by writers on ophthalmic surgery, under the denomination of varicose ophthalmia. In such a case, the external vessels are much dilated and have a varicose appearance. It is generally the result of long continued inflammation, in which both the internal and outer textures of the eye-ball have been involved, and often there is attenuation of the sclerotica with bulging and staphyloma, and the eye usually amaurotic.

## SECTION VII.

## ATROPHIA OCULI.

I have repeatedly stated that after severe attacks of ophthalmia, particularly of the more violent kinds, as purulent ophthalmia, ophthalmitis, &c., and frequently as a result of operations on the eye, a state of atrophy or wasting of the organ comes on. It is also sometimes a result of chronic inflammation, and is then of very slow progress, the eye shrinking gradually, and having a soft, flaccid feel, until it becomes reduced to a mere tubercle in size. Such a condition is, of course, beyond the reach of remedy. In this event, an artificial eye may be desirable when only one is thus affected.

*Artificial Eye.*—Imitations of the organ of vision are generally formed of enamel; they are usually nothing more than a thin shell of this material painted according to the colours most commonly observed in the eye. They are made convex in front, and are concave posteriorly, so as to lodge upon the remaining portion of the organ, and are usually of an elliptical or oval form, and reach across from the inner to the outer canthus, when introduced behind the eye-lids. They require to be removed and carefully washed every night, are very liable to get scratched, and usually require changing every few months. The patient should not commence wearing an artificial eye until some time after all irritation has ceased, and at first only for an hour or two each day.

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SECTION VIII.

## SIMPLE FUNGUS.

Fungous growths occasionally arise from various parts of the eye-ball, such as the conjunctiva, cornea, and sclerotica; sometimes from the iris, and at others from the orbit. When they arise from the iris, they often penetrate the cornea or sclerotica, and cause considerable irritation, and, in some cases, absorption of the eye-ball. They are, in general, easily re-

moved by the aid of forceps and curved scissors. In some instances, when these growths are very large, excite considerable irritation, and are frequently reproduced after their removal, it becomes necessary to extirpate the entire contents of the orbit, although the disease be not of a malignant character, in order to rid the patient of the deformity, suffering and anxiety which they occasion.

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## SECTION IX.

### FUNGUS HÆMATODES.

Bleeding fungus, or soft cancer of the eye, is not unfrequently witnessed. It is most commonly noticed in children, although not confined to them. In twenty-four cases which came under the notice of Mr. Wardrop, twenty were in subjects under twelve years of age. The disease is generally confined to one eye; but Mr. Saunders relates a case in which both were thus affected; and we have recently had an opportunity of seeing a similar case in the hospital. Other parts of the body are occasionally liable to this morbid condition, but the eye is the most frequent seat of it.

Malignant fungus is believed to arise, in the first instance, from the optic nerve. The diseased growth having perforated the tunics of the eye, expands itself either upon or underneath the retina, where it is first noticed, presenting a shining, metallic appearance, somewhat resembling the *tapetum lucidum*, the blood-vessels of the retina being seen ramifying on the morbid growth in the bottom of the eye. In the first stage of the disease, this is almost the only preternatural appearance observed. As the disease advances, this luminous appearance approaches nearer to the pupil. Vision must be destroyed at a very early period of the disease, if it be not so, as is most probable, at the outset. The pupil afterwards becomes dilated and motionless, and the external tunics are observed to be in a state of considerable vascular excitement.

With the advance of the fungoid growth, the vitreous humour becomes absorbed, and the crystalline is pushed forwards against the iris, and soon becomes opaque, when the morbid growth is concealed for a time. The

iris also loses its brilliancy, and undergoes a change of colour. The eye-ball then becomes enlarged, assuming an irregular and knobbed appearance, distended more in some parts than others. The sclerotica is thinned by absorption; ulceration of that tunic, or of the cornea, ensues; and the lens and some portion of the fungoid mass become protruded. When the tumour has perforated the eye-ball, it rapidly increases in size, and soon projects between the lids, which are incapable of covering it. There is a considerable discharge of a bloody fluid from the surface, and its appearance is that of a dark-red fungous mass. It is of a soft consistence and medullary texture, masses of coagulated blood seeming to pervade its substance; whence the term fungus hæmatodes.

In the last stage, the tumour projects from the orbit, and covers a considerable portion of the cheek, frequently attaining the size of a large apple, or even a still greater magnitude. Of course, the irritation caused by the progress of such an affection must be excessive. The patient sleeps but little, the health and strength are speedily undermined and exhausted by the pain and loss of blood, and coma and convulsions ultimately close the scene.

In cases of true fungus hæmatodes, no treatment seems to be of any avail. We can do nothing but palliate by relieving inflammation, when it exists in the early stage, as by the application of a few leeches, an evaporating lotion, and the like; and in the more advanced stages of the affection, as the disease and the patient's sufferings are on the increase, by the administration of anodyne and narcotic medicines. We might be inclined, *à priori*, to suppose that the extirpation of the diseased mass and of the whole contents of the orbit would afford a favourable chance for the escape of the patient from a premature death; but, unfortunately, this is not the case, for many eyes thus affected have been extirpated, with the invariable result of the disease again appearing within the orbit, so that extirpation is worse than useless, and that operation is now, therefore, very generally and justly abandoned. Moreover, cases exhibiting all the phenomena of fungus hæmatodes are occasionally witnessed in which the eye becomes atrophic, and in which no recurrence of the disease takes place.

It occasionally happens that a bright metallic appearance is observed in the bottom of the eye, after wounds or injuries, which has some resemblance to that seen in fungus hæmatodes, and for which it may, therefore,



sometimes be mistaken. This condition I have alluded to as *cat's-eye amaurosis*. It is distinguished by its occurrence after an injury, by an absence of irritation or enlargement of the eye, and is frequently followed by atrophy.

Sometimes *fungus hæmatodes* has been known to commence in the optic nerve, and advance externally to the globe, between it and the walls of the orbit, and has, subsequently, extended to the eye-ball itself. Occasionally the neighbouring glands enlarge, and are supposed to participate in the diseased action.

## SECTION X.

### MELANOSIS OCULI.

Another malignant disease to which the eye is subject, is that termed *melanosis*. It is so named from the black colour of the morbid structure. It is a somewhat rare affection. *Melanosis* is met with in other parts of the body, as well as the eye, but shows itself sooner in that organ than others. It is not likely that it commences there earlier than elsewhere; it is only more readily detected in the eye from its exposed situation, the transparency of its textures, and the interruption occasioned to its functions by that transparency being so soon destroyed. Unlike *fungus hæmatodes*, it only attacks adults; at least, we have no account of its having been observed in children.

CASE.—The late Mr. Fawdington, in his work on *melanosis* has related a case in which the disease commenced in the posterior chamber of the eye; a slate-coloured opacity was observed occupying the centre of the pupil, which was dilated and immovable; the conjunctival vessels were enlarged and varicose; and the sclerotica generally inflamed, and undergoing absorption, the dark choroid being perceptible at certain points. During the progress of the disease, the patient suffered considerable pain, which was relieved by bleeding, counter-irritation, and the usual antiphlogistic remedies. As the disease advanced, the absorption of the sclerotica increased, the morbid structure appearing to protrude through it, and pushing the choroid before it; the opacity posterior to the pupil assumed a dirty-red colour, resembling newly-organized lymph, and seemed the apex of a conical-shaped body, situated deep in the bottom of the eye. In this

stage of the disease, the eye was extirpated at the Manchester Eye Institution by Mr. Wilson, whose patient the man then was. "A section of the eye-ball discovered, in the situation of the vitreous humour, a black pulsatious tumour, occupying more than one half of the interior of the globe. There were two cavities, or cells, filled with a brownish-red fluid; one situated at the side of the tumour, the other anterior to it, and behind the lens. No trace of vitreous humour, or cells, could be discovered. The choroid was entire, and could easily be separated from the sclerotica, except at one point, towards its superior and internal part, where it ceased to be distinguishable from the general mass of the tumour. The sclerotica was here reduced to an extreme degree of tenuity, and had a split appearance. The retina was quite detached from the choroid by the interposition of the disease, and lay folded across the globe, forming a kind of septum between the black mass and the larger of the two cavities, containing the brownish-red fluid. The lens was opaque, and of a yellowish hue; the capsule thickened, but partially transparent; a fold of retina covered the posterior capsule. The ciliary ligament was distinct, and some ragged portions of membrane at the margin of the lens, and posterior to the iris, which was perfect, showed a remnant of the ciliary processes. The optic nerve, where it had been divided at the time of the operation, appeared to be sound." Such is the interesting account of the dissection of the eye, as related by Mr. Wilson. The individual recovered from the operation, but unfortunately the disease developed itself in various other organs, and he died six months afterwards, worn out by hectic.

From the account just given, it will be perceived that there are many points of difference between melanosis and fungus hæmatodes. In the latter, there is a luxuriance of growth which occasions excessive enlargement and protrusion of the eye-ball and the other contents of the orbit; whereas, in melanosis, the globe does not increase in size, nor is there any appearance of extreme vascularity, but, on the contrary, an almost entire absence of blood-vessels in the diseased structure.

In cases in which the eye-ball has not been extirpated, ulceration of the tunics takes place, and a black fungous mass protrudes, which increases slowly, and never attains a very large size. It does not bleed, but sometimes discharges a dark, grumous fluid.

If melanosis were simply a local affection, and the eye the only organ implicated, then the removal of the morbid structure would be sufficient to eradicate it; but, as it appears, beyond all doubt, to be a constitutional disease, appearing successively in various parts of the system, the extirpation of a single organ contaminated with it, can never be attended with

any but temporary and partial success. Accordingly, we find that in every well-authenticated case of melanosis, the removal of the eye has been followed by a brief respite only, the disease invariably breaking out in a short period in other and distant parts, and sometimes from the cellular membrane of the orbit from which the affected organ has been removed. So that hitherto the resources of art are valueless, except as respects soothing and relieving the sufferings of the unfortunate patient. I have certainly heard of cases of melanosis in which the eye had been extirpated, without any appearance of the disease having subsequently manifested itself in any other texture. Such, I imagine, to have been merely cases of staphyloma scleroticæ, with protrusion of the choroid, some of which have a considerable resemblance to the true melanoid disease, and for which they are sometimes mistaken.

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## SECTION XI.

### CANCER OCULI.

Another malignant affection to which the eye is occasionally subject is cancer. Schirrous, or cancerous degeneration of the eye-ball, is usually met with in persons of a somewhat advanced age; and females are said to be more obnoxious to it than males. Instead of the softened and medullary consistence observed in melanosis and fungus hæmatodes, the structures affected with cancer are of a firm, cartilaginous, and fibrous nature. Previous to an eye being affected with scirrhus, it is usual for it to have been frequently the seat of inflammation; these attacks will probably have produced an opaque condition of the cornea, more or less disorganization of the globe, and loss of vision: and the sclerotica will likewise be found to exhibit an unhealthy aspect, having a yellowish hue, with its vessels varicose and enlarged. During the progress of this affection, there is generally severe lancinating pain in the eye experienced, as well as lachrymation, and the other usual symptoms of irritation of the visual organ. As the disease advances the eye-ball shrinks, and becomes indurated; the pain extends to the head; the patient obtains little or no sleep; his appetite is lost; and he becomes gradually emaciated. The diseased

action spreads to the conjunctiva, palpebræ, and the various textures surrounding the orbit: these parts become inflamed and indurated; ulceration and sloughing succeed, with profuse discharge of a thin, acrid matter; and the long-continued irritation, restlessness, and anxiety finally destroy life.

Such is the usual progress of cancer, when it commences in the globe of the eye. More commonly, however, the eye-lids, or the textures surrounding the orbit, are first attacked, and the disease subsequently extends to some portion of the eye-ball. The progress is seldom rapid, but, on the contrary, many months, or even years, may elapse before its termination.

In the treatment of scirrhous of the eye-ball, we have to consider whether the disease be confined to the organ itself, or whether the eye-lids or the different textures and glands in the vicinity are similarly affected. If the eye-ball alone be the seat of the disease, then it is possible that its removal may be followed by perfect recovery. But unfortunately, as in the case of fungus hæmatodes and melanosis, such an operation is usually of but temporary benefit, for the disease is almost sure to return, either in the orbit or some other part of the system; and, as respects medicine, it is clearly established that no one article in the materia medica possesses the smallest virtue in arresting its progress. Under these circumstances there is but little encouragement to resort to the knife, and probably nothing but palliative treatment will, in the vast majority of cases, be applicable. The internal exhibition of opium, or some other narcotic substance, becomes necessary to relieve the sufferings of the patient. The liquor opii sedativus is an excellent local application in the more advanced stage: two or three drachms to an ounce of distilled water constitutes a lotion sufficiently powerful to commence with, and its strength may be gradually increased, until the undiluted substance is employed.

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## SECTION XII.

### EXTIRPATION OF THE EYE.

As circumstances may arise in which the removal of the globe may be

considered proper, I shall give a brief description of that operation, although, from what I have before stated, it will be obvious that there is but little encouragement to have recourse to so severe and dangerous a proceeding. Painful such an operation must necessarily be, from the sensitive nature of the textures through which the knife is to be carried, and dangerous because it sometimes hurries on the fate it is intended to prevent or protract. Cases have occurred in which this operation has been performed, when the patient otherwise might have lived months, or even years, that have terminated fatally within a few days, from the great constitutional excitement which followed. There must, in many instances, be a considerable risk of such a termination, more particularly when the disease is not confined to the orbit, but extends, as it occasionally does, posteriorly, into the cranium. So that, in cases in which there is a strong probability of the disease communicating with the brain, or in which the orbit or the neighbouring textures are contaminated with the malignant affection, which seems to call for the operation, we shall scarcely be justified in undertaking its performance.

When it is deemed advisable to proceed to the extirpation of the eye, it is to be performed in the following manner:—The patient is placed in the recumbent posture, his head supported on a pillow. The first stage of the operation consists in making a small incision through the skin and integuments, parallel with the natural fissure of the lids, from the external angle towards the temple, to such an extent as to afford ample room to get around the orbit with the scalpel. A large curved needle, armed with strong coarse thread, is then passed through the eye-ball, from side to side; the needle being removed, the ends of the thread are tied together, a proceeding which gives great command over the eye, and enables the operator to proceed more rapidly. A double-edged scalpel is now employed to effect the separation of the globe from its connection with the orbit. It is usual to commence at the lower part: having made an incision through the conjunctiva and inferior oblique muscle, the same process is continued at the upper boundary of the orbit, by detaching the superior oblique and the rest of the conjunctiva from their connection with the globe. The scalpel is then carried around the orbit, separating all the soft parts, and dividing the optic nerve close to the foramen opticum. It is necessary to be very cautious not to perforate the walls of the orbit, and particularly the roof, which is often much thinned, from disease or pressure,

so much so, that without care the scalpel might be readily pushed through into the brain.

Having ascertained that all the soft parts are removed, the lachrymal gland is next to be laid hold of with the forceps, and excised either with the scalpel or curved scissors. There is generally considerable hæmorrhage from the ophthalmic artery and its branches, but it is easily stopped by a compress of lint. After the bleeding has ceased, the edges of the wound, at the external commissure, should be brought together, and the palpebræ covered with a pledget of lint, wet with cold water. It was formerly the practice to fill the orbit with dry lint, but that is not now the custom, and is unnecessary, except there should be much bleeding otherwise it will only tend to excite irritation. A large dose of opium should be given immediately after the operation, and the patient treated according to the established rules.

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### SECTION XIII.

#### WOUNDS AND INJURIES OF THE EYE-BALL.

The subject of wounds and injuries of the globe is one of considerable importance. I have already noticed those affecting the individual textures, but sometimes injuries inflicted on the eye are of such a character as seriously to damage, more or less, the entire globe. Thus, in injuries produced by sharp and powerful instruments, projected with considerable velocity, such as the shuttle, in weaving, we often find a large wound, extending across the cornea, rupturing the anterior part of the sclerotica, separating the iris from the ciliary ligament, or tearing it right across, so as to occasion a very irregular and sometimes double pupil, with displacement and opacity of the crystalline lens, evacuation of the aqueous and a great portion of the vitreous humours, and prolapsus of the iris, choroid, and sometimes of the retina. In cases of so severe a character, the chances of a restoration of sight are very small; but I have occasionally been much surprised to find that in some a considerable amount of vision has been regained. On the other hand, it occasionally happens that a very slight blow or wound of the globe will instantly and totally

destroy vision. The immediate treatment of all such cases, particularly of wounds, should be that of keeping the eye perfectly at rest. For this purpose the application of strips of adhesive or court plaster, so as to keep the lids in apposition, in the manner I have before pointed out, is the most effective proceeding. The after treatment will depend upon the peculiar circumstances that arise.

Sometimes, foreign bodies are projected into the chambers of the eye, such as pieces of metal, shot from a gun, portions of gun-cap, and the like. When a small portion of metal or other substance has perforated the cornea, and is seen lodging in the anterior chamber, I think it best to make a small puncture, and endeavour to remove it with the aid of forceps, or the iris-hook, particularly when the case is seen at the time of the accident; but if the injury have happened at some former period, and the foreign body has not excited any irritation, it will probably be as well not to interfere, since it may gradually undergo the processes of solution and absorption, or become encysted. I have known instances, however, in which the eye has been destroyed, in consequence of repeated attacks of inflammation that had resulted from a piece of steel being allowed to remain in the anterior chamber.

CASE.—In a case which very recently came under my notice, a fragment of steel, about the size of a large pin's-head, had perforated the cornea, and was seen lodging upon the lower portion of the iris, near to its ciliary margin. The accident had occurred only an hour or two previously. I made a small puncture with a cornea-knife, through which the aqueous humour was discharged, then introducing an iris-hook I readily detached the foreign substance, although somewhat imbedded in the structure of the iris, and brought it out of the eye. The pupil was left slightly irregular, in consequence of prolapsus of a portion of the iris; which, however, afterwards regained its natural shape, and the patient experienced but little inconvenience either from the injury or the operation.

When the eye is injured from gun-shot wounds the effects are variable. If the cornea be much injured, of course vision may be destroyed from the resulting opacity. In cases in which one or two grains of gunpowder perforate the eye-ball, there is not much to be apprehended, except they should have entered the substance of the lens or wounded the capsule, when opacity will be the result, which must be treated as other cases of accidental cataract.

When a shot has struck against or entered the eye-ball, the effects are

in general more serious. Mr. Lawrence relates a case in which the eye was merely struck obliquely with a small shot, but which, nevertheless, produced complete amaurosis.

In cases in which the shot enters the eye, it usually passes into the posterior chamber, and is productive of considerable irritation, resulting in discoloration or opacity of the lens, a preternaturally contracted or dilated pupil, and paralysis of the retina.

CASE.—An interesting case of this description has been recorded by Dr. Butter, of Plymouth, in which a shot perforated the eye-ball, and extinguished vision. The patient did not experience much suffering immediately after the accident, but he was liable to occasional attacks of inflammation, at which times he had great pain in the injured eye, and much disturbance in the functions of the sound organ, so much so as to lead him to dread the loss of the latter. During these attacks, he had recourse to leeches, antiphlogistic treatment, and rest, which gradually procured relief. Under these circumstances, he was anxious that an attempt should be made to extract the foreign body. He was advised, however, to remain quiet for some time. At length, four and a half years after the receipt of the injury, occasional attacks of inflammation continuing to recur, extraction of the lens, which was opaque and of a bony consistence, was resorted to, without affording any relief, the irritation returning as before. Two years afterwards, Dr. Butter extirpated the eye in the usual manner, and, on dissection, discovered the shot firmly impacted in the optic nerve, close to its junction with the retina, where it had been lodged six and a half years before. After the removal of the organ, the irritation gradually subsided and did not recur.

Portions of gun-caps, which have been exploded in the act of firing, or by some other forcible means, frequently penetrate the globe. These are usually productive of a train of phenomena similar to those which result from shot or other metallic bodies perforating the eye. Cases of this description have of late very frequently presented themselves at the hospital. Mr. Crompton\* has recently given a published statement of several which came under the care of Mr. Barton. This latter gentleman, justly considering that the fragment in these cases had penetrated the globe, and probably remained in the posterior chamber, was led to perceive the propriety of making such an aperture as would admit of the escape of the foreign body. He was further led to believe that this operation, by giving exit to the source of irritation, would likewise have the effect of preventing that sympathetic inflammation which so often appears in the sound eye, as a result of previous injury. The operation is the same as

\* Medical Gazette, Vol. 21. page 175.



that for staphyloma, and consists in excising a considerable portion of the cornea, so as to permit of the complete evacuation of the contents of the globe. A large dose of opium should be given after the operation, and a poultice applied over the orbit. It usually happens that, within a few days, the portion of gun-cap has been found either in the coagulum plugging up the wound, or on the surface of the poultice. More rarely, it is observed to escape from the eye at the period of operation.

**CASE.**—Edward C., aged 28, cotton-spinner from Preston, was admitted an in-patient of the hospital November 1, 1841. From his account it appeared, that whilst hammering a percussion-cap, a fragment of the metallic body forcibly struck the right eye, but whether it actually entered, he was unaware. The accident occurred six weeks before his admission, and was followed by considerable pain and inflammation in the organ, which had continued to this time.

On examining the eye, a very considerable amount of vascularity, both of the conjunctiva and sclerotica, was noticed; the cornea was observed to be slightly opaque at several points, particularly near the centre, where a cicatrix had apparently formed, probably the result of the wound inflicted at the time of the accident; the pupil was completely obliterated, the iris changed in colour, projecting, and its central portion adherent to the injured part of the cornea, the anterior chamber being almost annihilated. The general form of the eye had undergone no change, neither was there any enlargement of it. Some degree of tenderness of the globe, on pressure being made, was complained of, and the pain he experienced was very severe, of a pulsating character, and much aggravated during the night. Vision was totally destroyed, and there was not the least perception of light. His general health had not been materially impaired. For the first three weeks after the receipt of the injury, he had been unable to attend to his work. He then resumed it for a few days, when the other eye becoming irritable, watery, and impatient of light, he was again compelled to desist.

From the long continuance of the irritation, and the nature of the injury, it appeared more than probable that a portion of the percussion-cap had been projected through the cornea and iris into the posterior chamber, and that no effectual relief would be obtained, except by an operation which would secure the discharge of the foreign body. This could only be accomplished by the removal of a portion of the tunics, so as to admit of the complete evacuation of the contents of the globe. In this case, vision being irrecoverably lost, there could be no valid objection to sinking the eye. Coupled with this consideration, the danger of sympathetic inflammation being established in the other eye—the premonitory symptoms of which had indeed already commenced—there could be no longer room for hesitation as to the propriety of adopting such a proceeding.

*2nd.* At a consultation this morning, it was decided that the operation of *sinking* the injured organ should be performed without loss of time. The patient,

naving assented, was placed on a sofa, the head and shoulders being duly elevated. The lids being properly secured, I passed my double-edged cataract-knife through the front of the eye, commencing at the outer canthus, in such a manner as to make a flap of the superior half of the cornea and a portion of the sclerotica; the flap was then laid hold of with the forceps, and, with the curved scissors, a large portion of the cornea with the adjacent sclerotica was excised. Along with the disorganized humours, a considerable quantity of puriform matter immediately escaped, and, in addition, *a fragment of the percussion-cap*, which had preserved its metallic character, not having become in the slightest degree corroded. A draught, containing forty drops of laudanum, was immediately administered, and a poultice ordered to be applied over the orbit, and occasionally renewed. He felt considerable pain for a short time after the operation, but in the evening he was quite easy. Another draught, containing thirty drops of laudanum, was directed to be given at bed-time.

3rd. He had six hours' sound sleep, being the best night since the receipt of the injury. There was no constitutional disturbance, and but little uneasiness about the eye. Ordered to continue the poultices.

4th. Made no complaint. A senna draught to be administered to-morrow morning, as the bowels had not acted since the operation.

6th. All irritation had ceased; the wound was quite healed, and the eye had sunk back into the orbit. The irritability of the left eye had also completely subsided. At his own request, he was discharged this day.

Percussion caps are usually made of copper, a substance which is incapable of solution within the eye, and over which the absorbents seem to possess no power. The result of such a body remaining in the eye is a continued series of inflammatory attacks, in which the disordered action is not always confined to the injured organ, but is likewise very apt to extend to the sound one.

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## SECTION XIV.

### SYMPATHETIC OPHTHALMIA.

The affection which I have thus designated has been ably described by Dr. Mackenzie under the head of *sympathetic iritis*. This term is, perhaps, somewhat objectionable, inasmuch as the eye is in many cases affected without the iris being implicated; whilst in others, the iris is far from being the exclusive seat of the affection, the internal texturea generally participating, I fully admit, however, that the iris is the part

that most frequently suffers, and that it is usually the focus of the morbid action which attacks the eye secondarily affected after cases of severe injury. Sympathetic ophthalmia is, indeed, by no means confined to such cases. I have witnessed many, in which chronic inflammation of the internal textures, having all the appearances observed after injury and which could not be distinguished except by the history of the case, was observed to be gradually developed in one eye, and afterwards very slowly extended to the other, apparently as a consequence of the irritation in the organ first affected.

In the previous pages, I have several times alluded to this subject, and remarked that it is a very common occurrence, as, indeed, is well known to the most superficial observer, for both eyes to become consecutively affected with the same disordered action, and that whether the external or internal tunics are the seat of the disease. This is so much the case, that when a patient complains of one eye being affected, the surgeon naturally inquires if the other be not in some measure similarly circumstanced; and such, in most instances, is apt to be the case. This sympathetic affection (if, indeed, it would not be more correct to consider it as a mere extension of morbid action from one organ to another, with which it is closely allied, both anatomically and physiologically,) is, as I have said, far from being confined to the diseases of the internal textures: on the contrary, I think it more frequently occurs in such as affect the external tunics, as is daily seen in purulent, catarrhal, pustular, and other varieties of conjunctivitis, as well as in affections of the cornea. True, in the diseases of the external tunics, the period which elapses between the morbid action developing itself in the eye secondarily affected, is generally briefer than is noticed in those of the internal textures. In the former, such as purulent or catarrhal ophthalmia, but a few days or even hours generally intervene, still there is in most cases a decided interval; whilst in other varieties, such as pustular ophthalmia, and more particularly corneitis, a considerable period frequently elapses, and sometimes the second eye is not attacked until after the recovery of the first, or when it is about recovering. This probably depends, partly, upon the greater or less susceptibility of the different textures to take on diseased action, the conjunctiva being the most susceptible of all, and partly upon the peculiar susceptibility of the individual.

Dr. Mackenzie imagines that if a particular portion of the eye, viz,

the junction of the cornea and sclerotica, be injured, there is a greater tendency to sympathetic ophthalmia being induced, than when any other portion of the organ is the seat of the mischief. It appears to me, however, that it is not so much the particular part of the eye which has received the injury, as the degree of violence with which it was accompanied, to which this tendency is owing. Dr. Mackenzie further remarks, that he has never witnessed sympathetic ophthalmia to result from such a wound as is inflicted during the operation of extraction; but this immunity, I apprehend, is more likely to be due to the comparative absence of violence than to the particular texture implicated, since it is, in general, only the more destructive injuries of the eye which are followed by the severe disease of which we are now speaking. The same able writer also supposes, and I think very correctly, that persons who are tainted either with scrofula or syphilis, or who are otherwise in an unhealthy condition of body, are more likely to be the subject of this secondary or sympathetic ophthalmia.

The mode in which the diseased action is communicated from the injured to the sound eye is a matter of speculation. The general opinion is, that the communication is effected through the medium of the optic nerves; but it is quite as reasonable to suppose that the nerves of common sensation are the real agents, these being always in a state of increased or morbid sensibility during an attack of almost every variety of ophthalmia. Such at least is likely to be the case when the outer tunics are principally affected; whereas, in internal ophthalmia, the extension will probably be effected by the agency of the ciliary or optic nerves, according as the iris or retina is most affected.

I have said that the iris is not the exclusive seat of the sympathetic ophthalmia, because in some instances the inflammation is confined to the external tunics, and in others the retina is almost solely affected. I have now a case which I have watched for a considerable time, one eye having been destroyed by a severe injury nearly two years since, and the other almost ever since the subject of a slight degree of amaurosis, indicated by imperfect vision, a somewhat dilated and inactive pupil, occasional appearance of muscæ and similar phenomena, but not the smallest degree of iritis. Mr. Lawrence has also remarked, that persons who have lost one eye from injury are frequently attacked with amaurosis of the other.

Sympathetic ophthalmia, when it affects the internal textures generally,

is certainly, in the majority of cases, a most severe and uncontrollable disease; and, when once fairly established, the chances of a restoration of vision are very precarious. This affection is characterized by the usual symptoms of deep-seated inflammation of the eye, such as a muddiness of the humours, a contracted, sluggish, or immoveable condition of the pupil, change of colour of the iris, and an extremely congested state of the sclerotica, and occasionally of the conjunctiva. If the affection be unsubdued, further changes take place, the iris becomes puckered and very irregular, the capsule opaque and adherent to the uvea, the pupil almost obliterated, the sclerotica attenuated, and, perhaps, bulging at one or more points, its surface, as well as that of the choroid, covered with varicose vessels, and the retina probably thickened from deposit of lymph, and perfectly insensible. The most rigid antiphlogistic treatment will, in many cases, be found to be totally unavailing, and yet it is the only one that can be resorted to with a probability of success. Bleeding from the arm, leeching, mercurials, the exhibition of purgatives, and counter-irritation, should be energetically employed in the outset, just as in a case of severe internal ophthalmia. There are very few cases, however, which are more than temporarily benefited by the adoption even of the most energetic measures of this description.

Seeing, then, that the morbid action induced under these circumstances is of so destructive and uncontrollable a character; the question forcibly presents itself, can anything be done to prevent the attack? Now, it has been pointed out and urgently dwelt upon by Mr. Wardrop, that a somewhat similar occurrence is frequently witnessed in the eyes of the horse; that that animal is frequently affected with an inflammatory disease which first attacks one eye, and is afterwards found to attack the other; that it is the practice of veterinary surgeons to effect the destruction or suppuration of the eye originally affected, in order to save the other from taking on the same disease; and that such practice is commonly successful. Ought this proceeding, then, to be adopted in cases of severe injury, one eye being certainly lost, and the other participating in the morbid action? I confess that I am strongly inclined to adopt this practice, and see no reason why it should not, under favourable circumstances, be attended with success. In the case, whose history I shall briefly relate, I adopted it, and although unsuccessfully, yet its failure was probably to be attributed to the advanced state of the disease, and to the circumstance

of the operation not having been resorted to at a sufficiently early period.

CASE.—Henry Hindle, æt. 21, on the 16th of March, 1840, whilst following his employment of weaving, received a severe injury of the *right* eye from a shuttle. The instrument had made an oblique and irregular wound across the upper and outer part of the cornea extending into the sclerotica; through the centre of the wound, viz., at the junction of the sclerotica and cornea, was a large protrusion of the iris, and probably of the choroid; the anterior chamber was full of blood, so as to prevent any view of the interior of the eye. He had suffered considerable pain since the receipt of the injury, which had much abated when he applied for advice on the following day. The eye-lids were brought together and kept in apposition by strips of plaster, and he was recommended to keep quiet, and to take a purgative occasionally. The case appeared to go on as well as such cases usually do until the expiration of a month from the receipt of the injury, when symptoms of inflammation were developed in the *left* eye. The usual antiphlogistic remedies, such as leeches, mercury, blisters, and the like, were resorted to with but little effect; when, on the 28th of April, he was admitted an in-patient of the hospital. At this time there was a most intense degree of inflammation presenting itself in the eye last affected, the conjunctival and sclerotic vessels being exceedingly numerous and congested, particularly the latter, the anterior portion of the membrane being of a deep purple or leaden hue; the iris had undergone a considerable change of colour, bulging forwards every where except at its pupillary portion, which appeared as if drawn backwards, being evidently adherent to the capsule, and much contracted and fixed, the capsule opaque, and vision nearly destroyed. There was a considerable amount of inflammation also still existing in the injured eye, the site of the wound very prominent, although the protrusion of the iris was much diminished, and he continued to experience some pain in it. He had been in the hospital four days, during which time the antiphlogistic and mercurial treatment was continued without benefit, when, a consultation having been held, it was determined that the operation of sinking the injured eye should be resorted to, in the hope that it might arrest the further progress of the mischief in the other. This operation was performed on the second of May, rather more than a fortnight after the commencement of the disease in the left eye. I made an incision of the cornea by passing a cataract-knife through the anterior chamber, as in the operation of extraction; the flap thus formed was then laid hold of with the forceps, and cut off with a pair of curved scissors, so as to remove the greater portion of the cornea. The excised portion of cornea was found much thickened from deposition of organised lymph on its posterior surface; and there was a considerable quantity of dark-coloured grumous blood occupying the posterior chamber, which being evacuated, the eye immediately collapsed. A draught containing forty drops of laudanum, was administered, and a poultice ordered to be applied

over the eye, which continued free from irritation after the operation, and occasioned no further trouble. The next day, as he complained of head-ache, the pulse being hard and full, and some constitutional disturbance present, he was bled freely from the arm, and five grains of calomel were ordered to be given him every four hours until ptyalism was produced. Four days afterwards he was in a state of salivation, and the calomel was, therefore, discontinued. Purgatives and other antiphlogistic treatment were also resorted to, and a blister was applied to the nape of the neck, and the part kept sore for several weeks. As soon as the ptyalism had abated, a pill, containing two grains of calomel, with half a grain of opium, was ordered to be taken every night, so as to maintain a slight mercurial action in the system. He remained in the house under this treatment five weeks, at the expiration of which time the inflammatory action had nearly subsided, but the pupil remained contracted, the capsule opaque, and the iris retaining the appearance it presented on his admission; vision was somewhat improved, and he was able to discern the fingers when held before the eye, light-coloured objects, and the like. Being at this time much reduced by the treatment resorted to, it was deemed advisable that he should return home into the country, and directions were given him to attend occasionally as an out-patient. I had hoped that after a time the eye would have got into a quiet state, and that some operative proceedings might have been resorted to with a chance of materially improving his sight. In this, however, I fear I shall be disappointed, for since his discharge he has been subject to renewed attacks of inflammation, and at this present time the eye is in as unfavourable a condition as at any former period, and vision has rather deteriorated than improved.

The result of this case would induce me, in future, to perform the operation at a much earlier period; in fact, as soon as symptoms of inflammation have become developed in the second eye. In the instance just related, the operation was, no doubt, performed too late to be of service, since the mischief that should have been averted had already occurred. When the eye is so severely injured, as in this case, there is scarcely a chance of any useful sight being restored. Moreover, an eye thus injured generally becomes either atrophic or staphylomatous. In the latter instance, the same operation is needed as that recommended for the prevention of the sympathetic disease of the other eye, so that it is only a question of time; whilst, in the former, the ultimate condition is the same, whether an operation be performed or otherwise. The operation when the eye is in a state of great vascular excitement, is certainly more painful than in other circumstances; but, when rapidly executed, is instantaneously effected, and the patient is relieved from further irritation in it, and, if resorted to sufficiently early, would, probably, in most instances, be the means

of arresting the mischief in the eye secondarily affected. Indeed, it is a question with me, whether it would not be good practice, in cases of such severe injury as generally give rise to the sympathetic ophthalmia, at once to evacuate the contents of the eye in the manner I have detailed. If we could point out the particular cases in which such sympathetic affection would be most likely to come on, then such a course would be clearly advisable; but it may, further, be a subject for careful consideration, whether the amount of irritation saved, by early sinking the eye, would not alone more than compensate for the pain occasioned by such an operation. When it is remembered, that, in these cases, the eye is the seat of very considerable pain and irritation, in a great measure, probably, owing to its being distended with coagulated blood, and that this state will certainly continue for many weeks or even months, and that after all the organ will surely be destroyed, and, perhaps, become staphylomatous, so as at last to require the same operation, the proposal—to sink the eye and remove the source of irritation—will not appear so very extravagant. Couple with this consideration the greatly-diminished risk of the other eye becoming affected, and I think that a strong case is made out in favour of the view I have been urging.

Dr. Mackenzie remarks, that he has never known an instance of recovery from sympathetic ophthalmia, and that renewed attacks have, in every case, terminated in the extinction of vision. Fortunately there are occasional exceptions, as the following instance clearly proves.

CASE.—Mary B., in February, 1839, being then six years old, received a severe lacerated wound of the *right eye* from a piece of slate, which had been thrown with considerable force from a short distance. She was brought to the hospital in a day or two after the receipt of the injury, when, on examination, a wound was discovered extending across the centre of the cornea and part of the sclerotica at the external canthus. The pupil was obscured by an effusion of blood into the anterior chamber. She complained of much pain in the eye, and vision was entirely lost. The eye-lids were approximated, and kept together by strips of adhesive plaster, and the usual precautionary treatment was advised. The wound healed and the eye had got into a tolerably quiet state at the end of about six weeks, but vision was destroyed and the organ rendered atrophic.

It was not until after six months had elapsed that the patient began to complain of the *left eye*. Symptoms of inflammatory action were then developed. These, however, were never of an acute character, but the pink zone, the discoloration



of the iris, the fixed and contracted state of the pupil, and the gradually extending opacity of the capsule and the lens, ultimately terminated in an almost total loss of vision, notwithstanding the prompt employment of the usual remedies, as leeches, mercurials, belladonna, and counter-irritation. She had occasional relapses of inflammatory action, so that it was not until the spring of 1841, and two years from the receipt of the injury, that it seemed proper to propose an operation.

July 17th, 1841. At this date, she had been free from inflammatory attack for several months. The sclerotics and cornea had both a healthy aspect, and the anterior chamber was of undiminished size, but the condition of the iris, and that of the pupil and capsule of the lens remained as before described. She had very small amount of vision, being only able to discern a lighted candle or some luminous or highly coloured object. As there appeared reason to hope that the retina retained a certain degree of sensibility, it was deemed advisable to give her the chances of an operation. A puncture was accordingly made at the inferior margin of the cornea with an extraction-knife, the point of the instrument being carried into the pupil so as to perforate the capsule and facilitate the exit of the crystalline lens. The scoop was next introduced through the wound into the pupil, and the opaque body, (which was simply the thickened capsule, the lens having been, evidently, previously absorbed,) was readily removed. The eyelids were then closed, and kept in apposition by means of the plaster dressings. A slight attack of inflammation succeeded, and was several weeks before it entirely subsided, when the pupil, which was drawn somewhat down towards the wounded part of the cornea, was found closed by either a portion of capsule which remained, or, more probably, by an adventitious membrane, the product of the inflammatory action. No improvement to vision had hitherto resulted.

November 6th. All irritation from the previous operation having long since subsided, it was agreed to proceed to the formation of an artificial pupil. The alarm and unsteadiness of the girl seemed to forbid the attempt at removing a portion of the iris by excision. I therefore passed the iris-knife through the sclerotics and iris into the anterior chamber; the instrument was then made to cut through the opaque membrane and adjoining portion of the iris, leaving a tolerably clear, but somewhat irregular pupil. The eye was then dressed in the usual manner.

9th. The dressings having been removed, the lower portion of the eye-ball, near the site of the puncture, was observed to be very vascular; the opaque membrane was no longer visible; the pupil appeared of moderate size, of an oval shape, and situated near the centre of the iris, but was evidently occupied by some effused matter. She had a very strong sense of light, and could observe the black marks on some writing-paper held before her. There had been no pain in the eye since the first day after the operation. The dressings were reapplied, and a purgative ordered to be taken occasionally.

13th. The patient had gone on favourably since last report; there was less

vascularity, and no uneasiness about the eye ; the pupil looked somewhat clearer, but was still occupied by effused matter, which had probably become organized ; vision had not improved ; the same treatment was continued. From this time the inflammatory action rapidly subsided, and it became evident that some further operative proceedings would be required before any useful vision could be expected. I considered it advisable, however, to give time to enable the eye to recover itself, and accordingly postponed another operation until the spring.

April 9th, 1842. There had been no undue amount of vascularity about the eye for some time past. The general appearance of the organ continued favourable, there being no opacity of the cornea, except at its lower margin—the site of the former incision ; the sclerotica still retained a healthy aspect, and the iris had not undergone any material change, the pupil being still obliterated or occupied by some effused and organized matter. This day I again punctured the cornea at its lower margin with an extraction-knife, and introduced a small iris-hook through the wound into the centre of the iris and former situation of the pupil. A portion of the iris was then endeavoured to be drawn out by the hook, but its texture, or perhaps rather that of the organized deposit, was so fragile that it tore through, leaving, however, an aperture of ample size and nearly in the usual situation of the pupil. She was able immediately to discern the persons of those around. The eye-lids were then secured with strips of plaster in the usual manner.

12th. On the removal of the dressings but little increased vascularity was observable ; the incision had apparently healed ; the pupil remained open, of an oval form, and of about the medium size. She could readily discern objects around. The dressings were renewed, and the usual treatment recommended.

16th. Proceeding very favourably. She had suffered no pain in the eye, and the vascularity was trifling. The pupil remained open and of undiminished size, a small portion of opaque matter occupying its lower margin. No unpleasant symptom occurred after this. She was, at the proper time, supplied with the usual cataract glass, which aided her vision very materially.

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## SECTION XV.

### MALFORMATIONS OF THE GLOBE.

In addition to the instances previously related of deficiencies and malformations of individual textures, I have to state that sometimes there is an absence of the entire globe witnessed

CASES.—I have seen two children, sisters, in this condition, having both eyes deficient at birth, the orbits being apparently occupied with nothing but cellular texture. There was likewise a very small aperture between the lids, which were but imperfectly developed, and without any lachrymal puncta, although the lachrymal gland must have been present, since there was a copious flow of tears occasionally observed, as in crying. In one of the children, who died when only a few months old, the optic nerves within the cranium were found to be remarkably small, as if atrophied or undeveloped. They did not enter the optic foramina, neither did they form the usual junction, but remained single through their entire course.

In some cases, only one eye has been developed. When this is the case, it has usually been found situated in the middle of the forehead, and formed of the two eyes imperfectly united: thus, the palpebræ were joined in the centre, the optic nerves in a state of union, two lachrymal glands, the lens very large, and the iris apparently divided. This deformity is seldom observed, except in domesticated animals. Other monsters have been described, having four eyes. These are generally accompanied by malformation of other parts of the body.

## CHAPTER IX.

## SUPPLEMENTARY AFFECTIONS OF THE EYE.

THERE still remain for consideration a few morbid or other irregular conditions of the eye, which, as their exact locality is not established, may now be brought in as supplementary matter.

## SECTION I.

## HEMERALOPIA.

This term, which is derived from the Greek, signifies *day-blindness*. In certain morbid states of the eye, the sufferers are unable to bear the smallest exposure to light. This may be said to be the case, more or less, in almost every inflammatory condition of the organ. We notice it more particularly, however, in the ophthalmia of strumous individuals. In this affection, the patient, as before pointed out, cannot endure the full light of the day for an instant; but if he be placed in a darkened situation, he is able to use his eyes with considerable freedom. This is the case also with the *Albino*, who retires from the glare of the day, and prefers rambling about in the evening; and hence he is often called *moon-eyed*. But it occasionally happens that this condition is observed in individuals whose eyes have been previously healthy, and who do not exhibit any of the ordinary appearances of disease or malformation; and to this the term hemeralopia may be properly applied. This disease is probably owing to some morbid state of the nervous system of the eye, and more especially of the nerves of common sensation, either in their origin, course, or final

distribution. I do not perceive that it is in any way connected with disorder of the retina, consequently I do not agree with those who regard it as a variety of amaurosis. I make this remark, because I have witnessed cases occurring in individuals somewhat advanced in life, in whom there was not the slightest alteration in any of the structures of the organ, the disease being purely functional, and consisting simply of morbid sensibility to light. In these cases, the function of the retina was unimpaired, vision being perfect, and none of the ordinary symptoms of amaurosis, such as muscæ and the like, being complained of.

Persons who have a dilated and inactive pupil (*mydriasis*) are also, in some instances, hemeralopic, because, when too much light is admitted through the pupil, the images are confused, and vision is consequently imperfect. We are likewise informed, that, in the opposite condition of the pupil, (*myosis*), the patient often sees imperfectly in the day, and better in the evening. Thus, Pellier has recorded the case of a woman who had suppressed menstruation, and was blind during the day, the pupils becoming so much contracted in a clear light that they almost disappeared: when the menstrual discharge returned, the disease subsided. If the contraction of the pupil be of a description to allow of dilatation taking place in a diminished light, then vision will probably be improved in the evening; but if, on the contrary, the pupil be fixed as well as contracted, as after an attack of iritis, then the patient's vision will usually be better during the day. Baron Larrey mentions the case of a person who had been confined in a subterranean dungeon for thirty-three years, and who, on being liberated, could not see, except by the light of evening.

It is probable, that a defence for the eyes, having a small central aperture, similar to that used by the Esquimaux; dark crape, as used by travellers over the African deserts; or staining the eye-brows, eye-lids, and cilia with some dark pigment, as practised in eastern climates,—might be serviceable in relieving this morbid sensibility to light. If this condition should seem to depend upon any constitutional derangement, or suppressed menstruation, our object must be to improve the general health, and to endeavour the restoration of the impaired function. In some instances, the employment of local stimulants to the conjunctival surface may, probably, be of service.

## SECTION II.

## NYCTALOPIA.

There is another affection, precisely the opposite of the former, to which the term nyctalopia is applied. These terms, nyctalopia, and hemeralopia, are very frequently confounded, sometimes being considered to indicate night and day vision; but the privative *a* would seem to lead to the inference, that it is the absence, rather than the presence, of vision that ought to be understood by their employment, so that it would appear to be more correct to translate these terms into night-blindness and day-blindness.

When a person is nyctalopic, he can see well enough in the full light of day, but, as night approaches, fails to distinguish objects, and can see little or nothing in a dull light. This affection is seldom observed except in tropical climates, where the eyes are exposed to the glaring light and burning heat of a vertical sun. Sailors are most disposed to it; and it is remarkable that persons who have been but little subject to it in northern climates, are most liable to be attacked with it when they reach the tropical regions, much more so than the natives themselves. It seems, therefore, reasonable to infer, that the exposure to the intense action of the solar rays is the exciting cause of this morbid condition of the eye.

Nyctalopia is commonly supposed to depend upon a partial paralysis of the retina, existing, of course, to a very limited extent. If there be giddiness or other affection of the head accompanying, it may, with equal plausibility, be referred to the brain. It is quite possible that the retina, optic nerve, or, perhaps, rather the cerebral portion of the optical apparatus, may be sufficiently influenced by the images produced in the bottom of the eye, when exposed to the solar rays, and yet be insensible to those feebler images which result from the dim twilight, or even artificial light. We know that there is a vast difference in the illuminating power of the sun and that of all other luminous bodies: *e. g.*, the illuminating property of the solar, as compared with the lunar rays, is stated by some authorities as 90,000, and by others 300,000 to 1. With this vast disproportion, we need not be surprised, that, under certain circumstances, the lunar rays, although sufficient to produce an image on the retina, may not be powerful enough to create such an impression on the nervous apparatus as to pro-

duce vision. Nothing, indeed, is more common than to hear persons complaining of their inability to see by candle-light, whilst by day-light their vision is unimpaired.

We are informed by travellers, that the light of the moon, in eastern countries, has a very peculiar effect upon some individuals. The Rev. Vere Monro, a recent traveller in the east, says, "the influence of the moon upon my head was so powerful, that, whenever its beams reached me, I was compelled to get up and move into the shade." It has also a peculiar effect upon the eyes. A captain, who had eyes of an unnatural blue, said that it was owing to his having been much exposed to the light of the moon.

What the precise condition may be upon which night-blindness depends is at present a subject of speculation. It is a complaint that is rarely observed in this country, and hence we have seldom an opportunity of investigating either its pathology or treatment; but we are informed by Mr. Bampffield, a gentleman who saw much of it in the east, that it is an affection which is easily removed by antiphlogistic treatment. Indeed, he states, that it was rarely necessary to do more than administer purgatives and apply blisters to the temples.

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### SECTION III.

#### ASTHENOPIA, OR WEAKNESS OF SIGHT.

Impairment of vision presents itself in such a protean variety of forms, and is described in such an endless diversity of terms, as to render its proper study a somewhat tedious and repulsive task. Although the catalogue would appear to be sufficiently extensive, there is still another affection which has not yet been described, but which demands notice. It has been variously designated by writers, but by none so appropriately as by Dr. Mackenzie, who has called it *Asthenopia*, literally *weak sight*, and has made it the subject of an instructive essay, in a recent number of the *EDINBURGH MEDICAL AND SURGICAL JOURNAL*.

Much as there is reason to object to the introduction of new terms into the ophthalmological vocabulary, it must certainly be admitted that this

is as free from objection as most; and although the term is novel, the affection which it denotes is neither new nor rare; oculists being continually consulted about what is commonly termed "weakness of sight."

In this condition of the eyes, the patient finds little or no inconvenience, when using them *passively*. He views the distant landscape, or walks along the streets, and observes surrounding objects without difficulty. If, however, he attempts to use them *actively*, if he takes up a book and begins to read, he can do so perhaps for a few minutes, or even much longer; but soon, an uneasy sensation is experienced, an aching is felt in the eyes, or they become watery; the letters seem confused, indistinct, and to run one into another. To obtain relief, the patient averts his eyes from the book, closes them, rubs over them, for a second or two, with his fingers, and then resumes his reading with the like result. The same is observed in sewing, or attending to any occupation which requires close application, so as to strain the eyes much.

This affection is unconnected with amaurosis, although it is commonly considered as a variety of it, is frequently termed amblyopia, and is often considered as having a tendency to terminate in it. In amblyopia, or partial amaurosis, the imperfection of sight is usually stationary and not liable to vary materially; whereas, in mere weakness of sight, the defect is only noticed when the eyes are intently occupied and exercised upon minute or near objects.

Asthenopia is, I believe, usually a congenital defect, but may be brought on by over exertion of the eyes, as in too close application to reading, writing, and the like. It is seldom very manifest until the children, who are the subjects of it, are sent to school, when the numerous exercises the organ endures soon causes it to be noticed. In other instances, it may not be observed until they are sent out to serve an apprenticeship, when, from the excessive employment of the eyes in particular callings, especially by artificial light, it speedily makes its appearance.

Every one knows from experience, that no kind of artificial light is so agreeable to the eyes, or so useful for the purposes of vision, as the pure light of day. Artificial light, from whatever source derived, is more or less irritating to the eyes. This arises from various causes. In the first place, its constitution is different: the red and yellow rays are known to preponderate, whilst the blue rays are proportionately deficient. So that, in reading by artificial light, the paper assumes a red or yellow hue



instead of pure white, as in daylight. Hence, the contrast between the paper and the letters is less striking, the latter are not so distinctly seen, and a greater straining of the eyes is necessary.

Artificial light, owing to this excess of the red and yellow rays, is likewise more heating and therefore irritates the eye in a much greater degree than day-light. Thermometrical experiments indicate the heating properties, as shewn in the following table by Sir Henry Englefield, to be

In the	Blue rays.....56	}	Degrees of Fahr <sup>t</sup> .
	Yellow.....62		
	Red .....72		

It is thus shewn that the popular notion is in conformity with scientific data,—that the blue rays are the coolest and the red rays the hottest.

“The heat acts injuriously,” says the late Dr. James Hunter, in his excellent work on artificial light, “not so much on the retina as on the external coats of the eye, and particularly on the lining membrane of the eye-lids; and by causing chronic inflammation and a diseased state of the secretions, renders indistinct the images formed on the retina, and necessitates the employment of a greater quantity of light than would otherwise be required. The dry and parched state of the air of a room where many lights are used, is very hurtful, and gives rise to the intolerable itchininess and stiffness of the eye-lids so generally complained of.”

Another cause of the injurious effects of artificial light is the formation and disengagement of carbonic acid gas during combustion. Carbonic acid gas, however, acts not immediately upon the eye, but indirectly by its noxious effects on the brain and nervous system. Its absorption by the lungs and skin, as in crowded public rooms illuminated by night, is the cause of the head-ache experienced afterwards.

Dr. Hunter further remarks, “The *unsteadiness*, and the generally *improper position*, of artificial light, are the next and the last of the causes of its injurious action on the eyes; and though, for all practical purposes, they may be easily obviated, they are in very general operation. Sun-light is remarkable for the equability with which it flows; and, in looking closely at an object illuminated by it, not the slightest wavering or flickering can be perceived. But all artificial light is more or less *unsteady*, from the impossibility of perfectly regulating the supply of air and inflammable material. The unsteadiness of artificial light is highly irritating to

the eyes, particularly if it take place to any extent, as in a gas-burner containing some drops of water ; but even in more common cases, a much slighter degree of unsteadiness always proves hurtful, by necessitating the employment of a greater quantity of light than would be required if the flame were always of uniform intensity."

The generally *improper position* of artificial light is also productive of very bad effects. Thus candles and gas-lights are usually placed immediately before the eyes, [and are doubly injurious by the direct as well as the reflected rays acting upon them. Though this could be easily obviated, yet it is scarcely ever attended to. Dr. Hunter visited many work-shops, printing-houses, tailors' rooms, counting-houses, and other places, and, in almost every instance, found the lights placed close to, and directly opposite the eyes of those engaged in fine work, requiring the excessive action of the sight, and frequently the mischief was increased by concave metallic reflectors placed behind, instead of around the light.

There is nothing particularly injurious in *gas-light*. Its cheapness causes it to be used to such an excess that bad consequences result, but, if moderately used, it is no more objectionable than any other artificial light. Those who are compelled to work by it should take advantage of any little intervals of rest that may offer, and, at such times, diminish the intensity of the flame, and also bathe the eyes with cold water.

To prevent the injurious effects of artificial light, then, care ought to be taken to defend the eyes from the direct action of the light upon them. This will be best effected by placing a shade over the burner, in such a manner that the light may be thrown upon the object on which the eyes are employed, whilst it is prevented from impinging on the eyes themselves. The best contrivance for this purpose is a conical-shaped reflector. It should be made of tin-plate or sheet-brass, bronzed on the outside, and painted of a light sky-blue on the inside. The ultra-marine is the purest and most durable pigment. The blue surface of the reflector should be smooth, but without any gloss. When a light blue reflector is used, objects, such as the page of a book, no longer appear of a reddish-yellow colour, but much whiter and purer ; the light becomes delightfully cool and agreeable to the eyes, and, from its whiteness, its defining power is much increased. Ground glass shades are of doubtful utility. Sir D. Brewster considers them to be injurious. Whatever contrivances are

adopted, however, it is impossible that artificial light can be rendered perfectly innocuous to the eyes. It must be used as little as possible.

For many other useful hints on the subject of artificial light the reader may refer to Dr. Hunter's work.

Dr. Mackenzie mentions the following classes of persons as being most frequently subject to weakness of sight: viz., clerks or book-keepers, apprentices to tailors, watch-makers, pattern-drawers, compositors, engravers, dress-makers, sempstresses, students, and those engaged in literary pursuits, who spend their days and great part of their nights in reading and writing, and individuals whose circumstances relieve them of any necessity to over-work their eyes, who are sober and chaste in their modes of life, and scrupulous observers of the general rules of health, but who, notwithstanding, frequently sacrifice their sight to their particular tastes in literature or in the fine arts.

In addition to over-exertion of the eyes, there are other causes which operate generally on the system at large, such as want of sleep, affections of the brain, venereal excesses, masturbation, the improper use of alcohol, opium, and tobacco. Protracted inflammation of the eyes, and injuries of the orbit and of the branches of the fifth pair of nerves, may also cause the affection.

The essential nature of the affection is, probably, debility of the nervous power of the retina, rendering it incapable of sustaining any long-continued exertion. Very likely, also, the nervous and muscular powers of the eye generally participate in the loss of energy. Dr. Mackenzie imagines that the adjusting powers of the eye are likewise weakened; but as no one knows what these are, or whether there be any adjustment at all, everything on this point must be mere conjecture.

*Treatment.*—There is not much to be expected from medical treatment in this affection. It will be satisfactory to the patient to know that the disease does not usually proceed beyond a certain extent, and that there is, generally, no fear of amaurosis supervening. The essential point is to abandon the occupation or habits which have brought it on: to avoid reading, writing, or any *active* exercise of the eyes, especially by artificial light. Those who find it impossible to do so, ought to use the opaque, conical-shaped reflector before described. Convex glasses are, generally, *indispensable* for reading, sewing, or other work, and do not appear to be

injurious. Care should be taken not to use too deep a focus, particularly at first. Spectacles may, also, be used of a blue or light gray tint, and of plain glass for ordinary purposes, if there be any external irritation or morbid sensibility to the stimulus of light.

Tonic medicines, such as quinine and the various preparations of steel, are, in some cases, likely to be serviceable, particularly when the weakness of sight appears to depend upon general debility. A generous diet may usually be advised. Alcoholic stimulants should be avoided. Cold bathing, change of air, a residence on the sea-coast, or a sea-voyage may be serviceable. The latter, if not likely to be otherwise useful, may be recommended as a means of diverting the patient from business or any injurious occupation. In some cases, I have found decided benefit from the occasional use of some stimulating application, as the sulphate of copper, either in substance or solution, to the conjunctival surface of the lids. Cauterization of the urethra has been advised in cases in which the debility arises from venereal excesses or other pernicious habits. Lastly, Mr. Adams, of London, as well as some continental surgeons, have recommended division of some one or more of the muscles of the globe. It is certainly difficult to imagine how such a practice can be beneficial. One would be almost tempted to think, that the benefits stated to have resulted from such operation, ought rather to be attributed to the repose which the eye would receive afterwards, than to the operation itself.

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#### SECTION IV.

##### COLOUR-BLINDNESS, OR IMPERFECT PERCEPTION OF COLOUR.

Individuals are occasionally met with who have not the power of distinguishing certain colours. Some have an idea of only two colours, blue and yellow, so that they perceive in the others only modifications of these two. Thus, such a person would confound a red coat with a yellow or green one; and a blue could not be distinguished from a pink. This was the case with the late Dr. Dalton, in honour of whom it has been proposed to call this affection *Daltonism*. Some there are, again, who do not discern any variation of colour, but perceive all objects either as black or

white. This imperfection was thought by Dalton, at all events in his own case, to be caused by a blueness of the vitreous humour; others have attributed it to a deficiency in the texture of the retina; whilst the phrenologists, with as much shew of reason, refer it to a defective development of the organ of colour, which they consider to be located in the brain. Sir John Herschel has also adopted this last view. With respect to Dr. Dalton's case, we are informed by Mr. Ransome, his medical attendant, that he found on a post-mortem examination, that nothing of an abnormal character was noticed in the condition of the eyes, but that there was a marked deficiency in the convolutions of the brain over the orbital plates, which are assigned to the organ of colour.\*

Dr. Hays, of Philadelphia, has related a highly interesting case of this description, which was observed in a patient recovering from an attack of amaurosis, and who had not previously been the subject of this affection.

CASE.—Mary Bishop, *æt.* 20, unmarried, cigar maker, admitted February 3, 1839. She had suffered previous to admission into the hospital, two attacks of cerebral disease, one in the spring of 1837, the other in the winter of 1837-8. After recovery from the first attack, objects for a time appeared to her double. The second attack left her entirely blind, in which condition she continued for four months. After this her sight began to return, and at the period of her admission into the hospital she could read large print, as the heading of a newspaper. She was of a short, robust stature, full habit, very dark complexion, black hair, and hazel irides, flushed face, colour of her cheeks at times almost of a purplish hue; catamenia suppressed. She had been largely depleted and had taken remedies for the restoration of the menstrual discharge, under which treatment her sight had improved.

On being asked whether she could see the figure in her dress, which was a calico one with red spots, she replied, "yes, I see the *brown* spots." Attention being thus directed to the subject, it was soon ascertained that while she could distinguish forms, even of small size, with accuracy, her perception of colours was exceedingly imperfect. From repeated and careful investigations on this and other occasions, it was evident that the only colours which she knew with certainty were *yellow* and *blue*. Nearly all other colours she termed brown, or hesitated to name, designating, however, their shades or intensity of colour accurately. Thus a deep red she called a dark brown, a bright green a light brown, and a very pale pink a very light shade of brown.

The patient was not at all sensible, when the investigation commenced, that she

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\* Phrenological Journal, Vol. xix., p. 252.

laboured under any particular defect in distinguishing colours. She had noticed, she said, however, that grass and roses did not appear as they formerly did to her; the latter especially did not seem of their natural colour; but as her sight was imperfect she considered this as a natural consequence. She remembered, when questioned, that as her sight began to return, *the first colour she perceived was yellow*. This fact is of much interest, and she stated it with a degree of confidence, and mentioned some particulars which left no doubt of the correctness of the statement. She asserted most positively also that she had formerly been a well able to distinguish colours as any other person.

With a view to a revulsive action on the brain, and also to re-establish the catamenial flow, the patient was ordered pills of blue mass, rhubarb and aloes, every alternate night, in a dose to purge actively; mustard pediluvia at bed time, and a blister to the sacrum. Two days before her regular period, mustard cataplasms were likewise directed to be applied nightly to the inside of the thighs, and the same diluted with an equal part of flour to the mamme. On the 29th of May, the catamenia appeared and flowed copiously, but continued only for a single day. It was followed, however, by very marked improvement in vision. On the 31st of May, she stated, with much satisfaction, that the roses now appeared to her of their natural colour, and that she could distinguish the difference between the colour of the rose and the leaves of the bush, which she had not previously been able to do. Roses of different colours being presented to her she named them all correctly; she could also distinguish small letters distinctly, but not more than three at one time, her field of vision seeming limited.

October 1st. A gradual improvement had taken place. By the middle of June, she was able, she said, to see the eye of a needle and the end of a thread, but could not thread a needle from inability to see both at the same time. Of the prismatic colours, she distinguished pretty accurately the yellow, blue, green, and red. The orange she hesitated about, and the violet she could not name. During October, she suffered from fulness of the head, with diminution of sight, the catamenia being still suppressed, flushed face, and active pulse. She was ordered V. S.  $\text{\textcircled{L}}$ , and to be purged with senna and salts. These remedies entirely relieved her head, but the catamenia continued suppressed. On the 30th of October she could readily read the small print of a newspaper, and could distinguish all the primitive colours and most of the secondary ones as correctly as could be expected from one of her moderate intelligence, with the exception of violet; this last she seemed always at a loss to name.\*

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\* American Journal of the Medical Sciences, August 1840, p. 277.

## SECTION V.

## MYOPIA, OR NEAR-SIGHT.

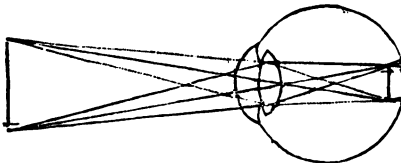
Myopia is not to be regarded as a disease of the visual organ. The construction of this organ varies somewhat in different individuals. At an early period of life, some are observed to have a difficulty in seeing objects which are situated at a distance, and if they happen accidentally to look through a concave-glass, are much surprised at the improvement which they find in viewing such objects. The degree in which myopia exists in different individuals is various, some having a difficulty only with respect to objects at some distance, whilst others are unable to see the letters of a book, except when almost in contact with the eye. Persons whose eyes are myopic are commonly unable to recognize their acquaintances, or to read the names on the sign-boards, across a street of moderate dimensions.

Myopia is usually considered to depend upon some slight imperfection in some portion of the mechanism of the eye; in which portion the presumed imperfection exists is, however, not satisfactorily established. There are some circumstances which seem to favour the view that it is to the impaired function of the iris that we are to look for an explanation of the question. The existence of myopia in persons who are much employed in looking at near, minute, or brilliant objects, (occupations in which the pupil is found to be much contracted,) appears to favour this view. Individuals who write or read much are often similarly affected; whilst, on the other hand, sailors, soldiers, and persons who are habitually on the look out for distant objects, are usually free from this inconvenience. There can scarcely be a doubt but that the imperfect action of so important a portion of the mechanism of the eye, as the iris must certainly be, will, to a certain extent, impair the function of vision. Accordingly we find that in cases of contracted pupil after iritis, although there may be no loss of transparency, there is often very imperfect vision, the patient being unable properly to discern such objects as are at a distance. That the size of the pupil has a regulating influence over vision, may also be inferred from the circumstance, that if we look through a pinhole in a card at the letters of a book, we shall find them considerably magnified; and, more-

over, we can see them with the eye close to the book, which we could not do without such a contrivance. Thus, also, in the case of a gentleman who, many years since, had an attack of iritis in one eye, the pupil being much contracted, I found that he could see any object much nearer to him with this than with the sound eye.

Sir David Brewster has related some experiments which go to prove that the application of a bright light to the eye, so as to cause contraction of the pupil, enables the organ to see objects much nearer it. Dr. Wells, on the other hand, found that after the pupil had been dilated by belladonna, vision of near objects became impaired. Dr. Wells also relates the case of an individual who had paralysis of the third pair of nerves with widely-dilated pupils: he could see the hour by a public clock at a distance, but could not read the letters of a book distinctly without the aid of convex glasses. Mr. Ware likewise mentions the case of a lady who, when not engaged in reading or sewing, had the pupil of one eye excessively dilated; but if she commenced reading, the pupil of that eye immediately contracted to the size of a pin-head, the book being held exactly at the distance of nine inches. With an artificial eye, it is also demonstrable that a small pupil is much more favourable than a large one for the representation of near objects. Many near-sighted individuals see objects at a little distance, such as the pictures on a wall, better in the evening, from the expansion of the pupil which then takes place, than they are able to do in the day-time. From all this it seems reasonable to infer, that a contraction of the pupil, in many instances, has something to do with the production of myopia, although there are many others in which the pupil is perfectly natural, or even considerably dilated, and yet myopia exists.

There are other conditions of the eye which, perhaps, more commonly tend to produce near-sightedness. Thus, if there be too great a convexity



of the cornea, the refraction of the rays of light will be so excessive that the image of a small object placed

beyond a certain distance will be formed anterior to the retina, and consequently will be imperfectly seen. This we find to be the case in an



extreme degree, in that condition of the eye termed conical cornea, as well as in cases of enlargement or dropsy of the anterior chamber. It must be obvious, likewise, that near-sightedness will result from the crystalline humour being of too convex a form, and that the same condition will be brought about by there being too great a distance between the situation of the crystalline and that of the retina.

That myopia may be occasionally induced by some morbid condition, or some malformation of the eye seems tolerably certain; but generally speaking, such I apprehend is not the case. The eye is in all cases a powerfully refracting optical instrument; in some to a greater, in others to a less extent. Very slight differences, in the convexity of the organ, we know, will produce a decided variation in its refractive power; and the greater the refractive power of the eye, the better will it be adapted for viewing near objects.

Now, an organ which is best qualified for viewing near objects cannot be so well adapted for distant objects, and *vice versa*. In every eye vision is limited to a certain extent; e. g. a myopic, or powerfully-refracting eye, can only see an object, as the letters of a book, within certain limits; and in proportion as such an eye can discern the letters near to it, so will be the difficulty of distinguishing them when removed to a distance. I assume, for the purpose of illustration, that there are three degrees of refractive power which most eyes possess; the first may be called the myopic eye; the second the mediopic; and the third the presbyopic. The myopic eye, then, will be able to read letters of a certain size, at a distance varying from, say two to about sixteen inches; the mediopic eye will read the same letters at a distance varying from three to twenty-four inches: whilst a presbyopic eye will only read them from four to about thirty-two inches. I do not give this as an exact rule applicable to all cases, but in some instances which I have investigated this has been the result. Nor do I mean to say that the letters will be seen equally well at any point of the scale I have given; on the contrary, they will be most accurately seen at the medium point (the point of distinct vision), and in proportion as we recede from that point in either direction, the letters will be less perfectly seen.

Myopia, then, I think, is not generally to be considered as a disease, for every eye is perfect within its own peculiar range of vision. The myopic eye has its range, so the presbyopic, so also the mediopic, or more

generally useful eye. As the last is probably the most common, it is, therefore, regarded as the standard of perfection, although it can neither see an object so far off as the presbyopic, or one so near as the myopic eye.

Intimately connected with this subject is that of the supposed adjustment of the eye to distances. It appears to me, however, to be perfectly clear, that no eye can discern any object except within its own peculiar range ; *e. g.*, no exertion can cause a mediopic eye to see the letters of a book out of the range I have mentioned ; but if the letters be enlarged, then the distance at which they can be seen will be proportionably increased.

If this simple view of the question be correct, I conceive it altogether disposes of the adjustment hypothesis. Admitting that there is a *point of distinct vision*, and that as we advance to, or recede from, the object in view, vision becomes less distinct until it ceases ; if the eye really possess the power of adjusting itself, why should the range of distinct vision be confined within the limits mentioned, as it is ?

This is at least indisputable, that no adjustment can take place within the eye, in the case of reading the print before mentioned, out of the limits of from three to twenty-four inches : and, in proof that the power of distinct vision within these limits is not dependent upon adjustment, we need but take the camera-obscura, and hold up before it any object and we shall have demonstrated the fact that an image, varying in the perfection of its outline, will be represented on the screen at various distances, having, like the eye, its *point of distinct vision* (if we may so say), and becoming less distinct as the object is brought nearer to, or removed farther from, the instrument.

That vision cannot be extended beyond the limits I have mentioned, is quite certain ; for if I look at the letters of a book situated farther off than those limits, I am unable to see them, whilst I can readily discern all the larger objects around me. There is no adjusting power within the eye which can enable me to see the letters under these circumstances. I see the larger objects, because their size and distance accord with the construction of my eye ; but the letters I do not see, from a want of such accordance. The only adjustment that can be effected here, is the lessening of the distance between the letters and the eye. But with the camera *obscura* adjustment may be effected, and the letters brought into view

without any alteration in their relative position; and this distinction should never be lost sight of.

The camera obscura, like the presbyopic eye, is best fitted to procure an image of an object at a distance. If its focus be changed, it will then, like the myopic eye, best represent an object near. The camera obscura can have its focus changed, as I have said, but the eye admits of no such change,—it can represent nothing beyond the limits mentioned.

The fallacy of the adjustment hypothesis consists in not taking into account the size of the object as compared with the distance.

When we speak of viewing near and distant objects, and ask, how can the eye give an accurate image of both without a change in its relations? we forget that it can only do so when the size of the objects is in proportion to their distance. Thus we see a church at the distance of several miles, and a model of the same only at that of a few feet. The image on the retina will be the same in both instances if the ratio in size and distance be maintained, and that without the agency of any adjusting power. Let this ratio be neglected, however, and the eye possesses no means of bringing the object into view, no power of adjustment.

So that, when we speak of adjusting the eye from near to distant objects, we speak in reality but of a change from lesser to larger ones. What change can be needed in looking from a ball of the size of an orange, at the distance of only a few feet, to another ball situated a mile off, of a size proportionate to the distance? It is clear that, if the latter ball were not of the required size, no adjustment of the eye could render it visible.

As long, then, as there is an accordance between the size of an object and its distance, so long will it be accurately seen, regard being had to the construction of the eye, whether it be presbyopic, myopic, or mediopic; and the converse is equally true, that, if this accordance be wanting, then the eye possesses no means of adjusting itself to remedy the deficiency, to bring the object into view.

Whatever may be the correct view of these different questions, the method of obviating the inconvenience sustained by myopic individuals is purely mechanical, viz., the use of an optical contrivance capable of diminishing the excessive refraction. This is only to be effected by the employment of a *concave lens*. It is to the optician, then, that we are to look for this remedy. With the assistance of concave glasses, the range of vision is altered in proportion to their degree of concavity; and

whilst using them, the eye is changed from a myopic to that of a mediopic, or even of a presbyopic, character, the vision of remote objects being materially improved, of course to the disadvantage of such as are nearer. These instruments can only act upon the rays of light previously to their entering the eye. They do not affect the eye itself, consequently that organ never undergoes any change from their employment. It never becomes less myopic, however long they may be used, and, therefore, the imperfection, if such it may be termed, is never removed by their use.

It is the practice with some opticians to inform persons requiring their assistance, that they will be able gradually to leave off the use of spectacles, as if it were a mere habit; whereas, if such were the case, the habit of doing without them would prevent the necessity of using them at all, which is contrary to experience; and, instead of a myopic eye becoming less near-sighted, I should rather say that there would be a slight tendency the other way, although it might not be owing to the use of spectacles.

As the eye is more or less myopic, and the amount is variable in different individuals, so the spectacles should be more or less concave. The concavity should not be too great, such as the individual can see comfortably with, (reference being had to near as well as remote objects,) being preferable to those which diminish the object too much, because they are then apt to dazzle and irritate the eyes. At first, their use is generally attended with slight headache and vertigo, so that they should not be used at too long a period at once. The same results often follow from changing spectacles, even when their power is nearly the same as those previously used.

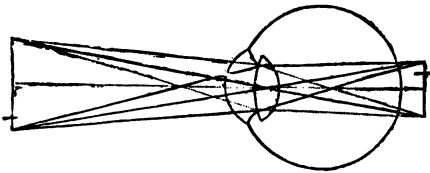
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## SECTION VI.

### PRESBYOPIA, OR FAR-SIGHT.

The opposite condition to myopia is, as I have already intimated, that termed presbyopia, or far-sightedness. This term is derived from two Greek words signifying *old* and *eye*, because in elderly persons far-sight-

edness usually exists. At this period of life, the convexity of the eye is diminished; and this is the case both with the cornea and crystalline lens. As the density of these structures is usually at the same time somewhat increased, this change has a tendency to counterbalance the effects which result from the loss of their convexity; and hence we find that many old persons possess unimpaired vision as long as they continue to exist. But very frequently, there is so much flattening of the refractive media, that vision becomes materially impaired. When this is the case, the individual loses the power of seeing small objects, and can with difficulty read the ordinary-sized letters of a book. In the first place, he can only see them when held at a considerable distance from the eye; and as the change increases, he cannot see them under any circumstances without optical assistance. On the other hand, he is able to discern large objects at a much greater distance than other persons. This diminution of the



convexity of the organ operates in this manner: the rays of light which proceed from a small or near object are not sufficiently re-

fracted to produce an image upon the retina; and as the focal distance is at a point posterior to the nervous membrane, consequently no correct impression of the object is conveyed to the brain. Presbyopia, though most frequently met with in elderly persons, is by no means confined to them, any more than myopia is confined to the young.

It may be thought, that the condition of the pupil, as it appears to do in some cases of myopia, has likewise an effect in producing presbyopia; that, as a contracted pupil, in some instances, appears to contribute to near-sightedness, so an unusually-dilated pupil may have a tendency to bring on far-sightedness. To satisfy myself of the effect of dilatation of the pupil, as to viewing near and distant objects, I produced an artificial dilatation of the pupil of my right eye by the application of belladonna, whilst that of the other eye remained of the natural size, which is usually rather contracted. When a book was held at four inches distance from the eye whose pupil was dilated, the letters were very indistinct, and at two inches distance were invisible; whereas to the other eye they were quite distinct.

at either distance. At a distance of nine inches, the dilated eye could read the letters with ease. So far it appears clear that a large pupil is unfavourable for viewing near objects. The next point, then, was to ascertain its effect on distant objects. Here the same defect was observed as with the letters; persons walking at a distance, the houses and other remote objects were all less distinct when seen through the larger than the lesser pupil. This defect was not removed, though diminished, by using concave glasses; for, on looking through these at persons and objects at a distance, the dilated eye was unable to discern many that were distinctly visible to the other. In short, objects at intermediate distances were alone accurately seen. It is quite clear, then, that presbyopia is not simply dependent on the condition of the pupil, but that it is to be referred to a diminution of the convexity of the refractive agents.

The obvious remedy for this condition of the eye is the employment of a *convex glass*. This produces the necessary convergence of the rays of light, which the eye is of itself unable sufficiently to effect. It is proper to employ convex glasses upon near objects only, as in reading or writing; indeed, those who use them generally look over them when viewing distant objects. As in choosing other glasses, those are to be selected through which the individual can see with the least optical aid, in other words, with the least converging power. Those which converge the least have a focal distance of about thirty-six inches; whilst those which produce the greatest effect of this kind are of six inches focus. There are many gradations between these; but it is best to begin with the highest number first. The focal distance is ascertained by holding up a piece of white paper on one side of the glass, and a lighted candle on the other. The distance at which the most perfect figure of the flame is seen upon the paper is the focal distance.

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## SECTION VII.

### STRABISMUS, OR SQUINT.

This is a highly curious and interesting subject, and one to which the genius of Dieffenbach has recently given a degree of practical importance, which it never before possessed.

The uniformity in the direction of the two eyes, in a state of health, is a very remarkable circumstance. It is not the result of education, nor the force of habit, nor does it depend upon the will. So regular and constant is it, that it can only be regarded as a law of the animal economy, for we observe it in the newly-born infant, continuing through life, and only ceasing from some morbid condition affecting either the nervous or muscular system of the eye. Many as are the interesting topics connected with the physiology of vision, there are few which are more curious than this invariable consent in the direction of the two eyes. Let one be turned in whatever direction we may choose, and the other instinctively follows or rather accompanies it. Indeed, the will is totally unable to prevent it. We cannot, for instance, elevate one eye without the other being at the same time elevated; neither can we depress either separately. We cannot look at an object which requires one eye to be turned inwards, such as a body placed contiguous to the nose, but the other turns in the same direction. If we look straight forwards, one is directed parallel to the other. And, what is most curious, and apparently contradictory, is the fact that when one is directed outwards, the other is always directed inwards. No exertion that we can make use of, no effort of the will, can enable us to direct both eyes outwards at the same time. In this arrangement we witness a most curious provision of nature, and one which is not superfluous but essential to the perfection of vision, because but for it, when one eye is turned outwards to behold an object situated laterally, the other would be turned contrariwise, and then we should have one of these organs directed towards the object and the other from it. In short, it is clear that every arrangement as regards the motions of the eyes is designed to effect a uniformity in their direction, so that both may always be turned towards the same objects.

If this uniformity in the direction of the two eyes be lost or impaired from any cause,—if the direction of one ceases to correspond with that of the other, then there is that peculiar appearance which is known by the term strabismus or squint. What the precise pathological condition of the nerves or muscles of the eye may be in this affection is, perhaps, not established. Generally, the squinting eye is not paralytic, because if one organ be covered up, then the other will be found to have its motions perfect in every direction. For the same reason, it is evident that no shortening or contraction of the muscle, which draws the eye in this

irregular manner, can exist. So that it is plain that the independent movements of an eye thus affected are perfect, that it is the associated action that is defective, and that the organ is only inactive when it ought to move conjointly with its fellow.

When we reflect on the complicated arrangement of the muscular apparatus, and the intricacy of the nerves which regulate the movements of the eyes, that no less than six pairs of muscles and three pairs of nerves have either to be brought into action, or become relaxed, before the slightest alteration in their direction can be properly effected, we shall cease to wonder that those actions should occasionally be disturbed and irregular, and lose that perfect uniformity which they usually present.

In most cases of strabismus, then, we shall find that it is merely this absence of agreement in the direction of the two eyes which constitutes the defect in question. In some instances, one eye only appears to be affected, and it is commonly directed inwards; whilst in others both are so directed; and this variety of the affection is termed *strabismus convergens*, in contradistinction to an opposite condition, less frequently witnessed, in which the eye is directed outwards, and therefore called *strabismus divergens*. In some very rare instances, the preternatural direction of the eye is upwards, when it is termed *strabismus sursumvergens*; or it may be downwards, when it is named *strabismus deorsumvergens*.

Ordinary strabismus comes on early in life, during infancy or childhood, and in most cases vision is not materially impaired. In some instances, and more particularly in adults, strabismus is an accompaniment of amaurosis, although the latter is frequently witnessed without the former. I apprehend that when the two are combined, it will generally happen that the cause of the mischief is in the brain, affecting the optic and motor nerves either in their origin or course; and that when amaurosis is the result of disease of the retina, or of the optic nerve alone, then strabismus will be less likely to exist. At all events, we know that strabismus is a frequent result of affections of the brain.

In those cases of strabismus which accompany paralysis, the patient at first sees double, and no doubt such will be the case generally. This, however, is but a temporary defect, the double vision ceasing after a time notwithstanding the continuance of the squint. Opportunities of verifying this remark frequently occur. This fact was noticed by Cheselden, who



relates the case of a person who had one of his eyes distorted by a blow : for some time every object appeared double, but by degrees the most familiar ones became single, and in time all objects became so, though the distortion continued. Dr. Hawkins has likewise related an interesting case in which, among other paralytic symptoms, strabismus was present. The double vision after a time disappeared, although the distortion remained ; the sight of this eye was then lost : it seemed not unlikely (says Dr. H.) that double vision would again be produced when the healthy action of this eye should be about to be restored. This was afterwards found to be the case. (MEDICAL AND PHYSICAL JOURNAL, vol i., p. 221.) The same result we now know to be a constant occurrence after strabismus has been removed by operation.

Many causes are assigned for the production of strabismus. By some it is thought to be congenital and even hereditary. Imitation, the habit of looking at the point of the nose, the position in which children are made to lie, and other similar causes, are sometimes referred to as the origin of strabismus. It is very doubtful if such trivial causes as these are alone capable of producing the deformity. Inflammation of the eye, ulcers and specks of the cornea, and congenital cataract, are also considered to be efficient causes ; in the latter cases, the eye seems to be habitually directed so as to permit the rays of light to penetrate any portion of the cornea or crystalline that may retain a degree of transparency. A defective sensibility of the retina is also regarded by some as a very frequent cause of strabismus. The sight of one eye being impaired, it is thought that the impressions on the retina are disregarded, and the weakened eye, therefore, ceases to be directed towards objects which the sound organ is in search of. That this last condition does not necessarily produce strabismus may, however, be inferred from the fact, that in numerous cases of weakness of sight, or even of amaurosis of one eye, the irregularity in question does not exist. On the other hand, an eye affected with strabismus may have its power of vision diminished by being habitually unemployed.

Various morbid states of the brain indisputably tend to the production of strabismus ; such are hydrocephalus, convulsions, apoplexy, and the like. Strabismus, indeed, is often one of the earliest indications of some disordered action of the brain : and I have witnessed many cases of young children in whom for a long time this was the only evidence of such disordered action, but which, nevertheless, after a certain period, terminated

in hydrocephalus. On this and other accounts, I am led to suspect that the brain is, more or less, affected in most cases of strabismus arising in infancy or childhood. Sometimes, doubtless, irritation in more remote organs, operating through the medium of the nervous system, may induce this affection, such as teething, worms, derangement of the digestive functions, and the like. Blows about the orbital region, and injury of the frontal nerve, are also thought sometimes to produce the affection. Mental emotions, such as fright, have likewise been considered as an occasional cause of strabismus.

*Treatment.*—The treatment of strabismus must be regulated by its presumed origin. If the affection be recent, and apparently connected with some morbid condition of the brain, our remedies must of course be directed to this organ. As I have just remarked, it frequently happens that strabismus is one of the earliest symptoms of that affection of the brain which so frequently terminates in hydrocephalus; and it is probably not too much to say, that in every case of strabismus arising from an internal source, the brain is either primarily or indirectly affected. It is true that in many cases, there may not be any extensive or even appreciable lesion, but still to a sufficient extent to lead to an aberration of the functions of that portion of the brain upon which the integrity of the motor powers of the eye depends. In such cases then, where there is reason to believe that the central organ of the nervous system is the source of the affection, our treatment must be directed accordingly; and no doubt blood-letting, mercurials, purgatives, and counter-irritants, are the remedies to be adopted. If there should seem reason to believe that the brain is but sympathetically affected, and that the disorder originates in the intestinal canal, from worms or other irritating matters, then purgatives, and such remedies as may be expected to improve the secretions, will offer the best chances of success.

But little benefit is to be expected from the use of goggles, and similar contrivances worn before the eyes. Bandaging up the sound eye, and causing the patient to exercise the defective one alone, for a couple of hours a-day, is said to be in some cases productive of benefit. Generally speaking, however, there is but little reliance to be placed on this class of remedies; they are, indeed, only resorted to in cases which are supposed to be confirmed, and have defied the employment of medical treatment.

*Operation for Strabismus.*—But the grand remedy for the cure of con-

firmed strabismus is yet to be considered. This is the operation, first practised by Professor Dieffenbach, of Berlin, of dividing one or other of the muscles of the eye-ball. This operation, which has only been introduced within the last six or seven years, has now been performed on an immense number of individuals in all parts of the civilized world, and, so far as we can at present judge, with considerable success.

As by far the larger proportion of cases of strabismus are those in which the eye is directed inwards, the operation to be performed will usually be that of division of the internal rectus muscle, or of its tendon. This operation is one of no great difficulty, and only requires a little practice and a certain amount of tact to insure its rapid and efficient performance. It is not, however, to be resorted to without some degree of caution, since numerous accidents have occurred, either from rashness or awkwardness. Although the operation is generally very successful, yet I should say that it is much easier to divide the internal rectus muscle, than to cure strabismus. In some cases the operation certainly fails; but it is no valid objection to its general performance, that it is not always successful. I do not know, indeed, whether sufficient time has as yet passed away since the introduction of the operation into practice, to enable us to decide as to the permanency of the improvement which is unquestionably effected in most cases. It is now about six years since I first performed the operation, and all that I can say is, that up to this time all those cases in which the distortion of the eye was removed after its performance, the improvement as far as I have been able to ascertain, still continues: so that I think we may reasonably conclude that the improvement will be lasting. In some cases, no doubt, the eye is left more prominent than before; and in others, there is a slight eversion noticed. In a certain number, too, the inversion, though diminished, still exists.

The method which I adopt in performing the operation is the following. When one eye only is affected, the sound organ is covered with a bandage, passed around the head. An assistant secures the upper lid of the affected eye, whilst the lower is depressed by means of the spring speculum. The patient being directed to turn the eye outwards as far as possible I seize hold of the conjunctiva with a pair of iris-forceps, and with Maunoir's scissors make a small incision from below upwards, just over the tendinous portion of the internal rectus: the tendon being thus exposed, I next pass one blade of the scissors under its entire breadth, and then bring the

blades together, so as to separate it from its connection with the globe, when the operation is completed. If the other eye be also affected, the proceedings will then require to be reversed; the bandage must be applied over the eye first operated upon, and the same incision through the conjunctiva and tendon of the internal rectus of the other eye is then to be effected. In the cases of children, or other unruly subjects, it becomes necessary to use a sharp hook, which is made to perforate the sclerotica, so as to fix the globe. After this is done, the division of the conjunctiva and of the tendon will be readily effected, as before explained.

The operation of dividing the internal rectus muscle is, as I have said, usually sufficient to prevent the eye from being again drawn into the inner canthus, and the patient is consequently relieved from the defect under which he previously laboured. But it is an ascertained fact, that the separation of the tendon of this muscle from its connection with the globe is not always sufficient to remedy the evil, although it may diminish it to some extent. In this event, it is presumed that preternatural adhesions have formed between the cellular membrane of the orbit and the globe itself; and hence a free incision through the cellular tissue is recommended to be practised, with a view of liberating the globe, which is described as being bound down by these adhesions. I confess that I entertain some doubts as to the correctness of this supposition. First, because if adhesions exist to such an extent as to bind down the eye in this manner, I conceive that it would be impossible for it to be drawn in the opposite direction by the external rectus, which may generally be done; and, secondly, because in cases where simple division of the internal rectus muscle has failed to remedy the defect, I have not found that incising the cellular membrane of the orbit has produced any improvement. If adhesions have really taken place, the eye must then be incapable of motion outwards, and a free incision in such circumstances might perhaps be beneficial.

When an operation on one eye has been unsuccessful, we are recommended by Mr. Elliott, of Carlisle, to proceed at once to the operation on the other, whether the latter exhibit an appearance of squint or not. The reasons assigned by this gentleman appear to be very plausible and his practice successful. It is sometimes, however, not easy to say beforehand whether one or both eyes are affected in this manner. The best way to judge of this is to close the apparently-sound eye, and leave the patient to

observe with the distorted one, which is then, of course, quite straight. If the first be now partially exposed, it will be seen, that, instead of being directed straight forwards, it will, if affected with strabismus, be turned towards the inner canthus. This rule, however, is not infallible, for I have found, that, when this has been the case, and I have pronounced both eyes to be affected, an operation on one has been sufficient to remove the defect. On the other hand, as in Mr. Elliott's cases, when there is every appearance of the disease being confined to one eye, it is sometimes found necessary to resort to the operation on both.

When successful in removing the squint, the division of the internal rectus muscle does not prevent all motion of the eye inwards, it only diminishes that inordinate action which causes it to be impelled in that direction when removed from the immediate control of the will. Hence we presume that some other power enables the organ to move in that direction after the division of the internal rectus. That power must be supposed to be in the superior oblique muscle; and we find that Dieffenbach and some others, after ineffectually cutting across the internal rectus, have removed the distortion of the eye by the division of the trochlearia.

In cases in which, after an efficient section of the tendon of the internal rectus has been made, and the eye nevertheless continues to be drawn inwards, it has been suggested to apply a ligature to the sclerotic portion of the tendon, which, being secured by strips of plaster on the temple and side of the face, will bring and maintain the eyeball into its proper central position, until after the healing of the wound, when the inversion will be found to be completely removed. The same result may also be looked for from the use of the ligature, after an unsuccessful division of the tendon of the external rectus. This proceeding has been extensively adopted by Mr. Wilde, of Dublin, who has published several interesting cases in which this treatment was very successful.

Mr. Wilde employs "two ligatures, of a single thread each, which are passed through that portion of the tendon which remains attached to the sclerotic. The ends of these ligatures are then drawn outwards and downwards, so as not to cross the cornea; they are then to be attached to the cheek-bone on each side by means of strips of adhesive plaster, care being taken to draw the ligatures so tight that a slight divergent strabismus is produced . . . In fixing the ligatures care should be taken to fasten them by a second coil into the muscle, otherwise, if allowed to play in a loop, they

will cut through sooner than their object is effected. When we have reason to believe that they will be required, the portion of muscle attached to the sclerotic should be left longer than usual, by dividing it between the hook and its origin, as far back as we can with safety manage. In attaching them to the cheek or nose, care should be taken that they do not cross the cornea, which, in case of internal strabismus, will be avoided best by drawing them, immediately after their insertion, without the lower lid. This turns the eye, it is true, slightly downwards; but that is, at the moment, of little consequence. The inability of closing the lids in sleep is an objection to the ligature being made to cross the upper eye-lid. In fastening them externally, the best plan is, first, to apply a slip of plaster on the cheek, then lay down the ligature and cover it with another strip, and having drawn the threads to their proper degree of tenacity, reverse their ends and apply a third piece of the adhesive plaster, about twice the size of the other two, over all."\*

With respect to external squint, or divergent strabismus, this is much less frequently met with, than the convergent variety. In the normal state, the power which tends to draw the eye inwards is greater than that in the opposite direction. Not only the internal rectus, but most probably both the oblique muscles tend to bring the eye towards the inner canthus; and it is likely that the greater frequency of internal strabismus is owing to this preponderating power in that direction. The operation of dividing the external rectus is almost precisely similar to that of the internal, the only difference being that the incisions are made from the external instead of the internal canthus.

After the division of the internal rectus muscle, it occasionally happens that the eye becomes directed outwards, and the case is converted from convergent to one of divergent strabismus. In this event, it becomes necessary to perform the same operation on the external rectus; and this is frequently successful in restoring the uniformity in the direction of the two eyes.

*After-treatment.*—The treatment after the operation of dividing the muscles of the globe is best conducted on the principles I have before explained, in speaking of wounds and the various operations on the eye. All that is commonly needed is to keep the organ at rest by means of

adhesive strips passed over the lids, so as to keep them in apposition. If severe inflammation ensue, it may be necessary to resort to bleeding and general antiphlogistic treatment. This, however, is but rarely necessary.

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## SECTION VIII.

### PARALYSIS OF THE MUSCLES OF THE EYE-BALL.

Sometimes, instead of the irregular action witnessed in cases of strabismus, we find the eye-ball nearly or altogether deprived of the power of motion. Of course, if all the muscles are paralyzed, then the eye-ball will be completely immoveable, and remain perfectly fixed almost in the centre of the orbit; a condition to which the term *lucitas* has been applied. This, however, is a comparatively rare disease; but, when met with, it must be subjected to the treatment I shall have to advise for a more common variety of paralysis of the muscles of the eye.

### PARALYSIS OF THE MOTOR OCULI.

The most frequent form of paralysis of the eye-ball, which we observe, arises from disease of the *motor oculi*, or third nerve, and which is recognised by the following symptoms. The upper eye-lid is observed to droop and cover the front of the eye, the patient having no power to raise it by a voluntary effort. If the eye-lid be elevated with the finger, the globe is found to be turned directly outwards. If the patient be requested to look inwards, upwards, or downwards, he has not the power to do so: the sound eye moves in any of these directions, but it is unaccompanied by a corresponding movement of the affected eye. The pupil, too, is generally more dilated than that of the sound eye, and motionless. This expanded and inactive condition of the pupil gives to the eye a dull, vacant appearance, as if it were amaurotic, which it usually is not. Vision, however, is apt to be slightly impaired, as might be expected, from the dilated and immoveable state of the pupil, and the almost motionless condition of the eye.

The symptoms I have detailed, then, clearly point to some morbid condition of the *motor oculi* nerve, or of some portion of the brain with which

it is connected, because we know that the branches of this nerve are distributed to the levator palpebræ, the rectus superior, inferior, and internus, and to the inferior oblique muscles, as well as to the lenticular ganglion, the source of the ciliary nerves; and thus we are enabled to account for each symptom with the utmost certainty and precision.

In addition to the symptoms previously enumerated, the patient at first experiences double vision, when the superior palpebra is raised, or when it does not completely cover the eye, a symptom which is owing to a want of correspondence in the direction of the two eyes. Vertigo is another troublesome symptom, frequently complained of, more particularly when the patient attempts to look at any object with the paralytic eye; and very often headache and other signs of cerebral disorder exist.

In some instances, the disease is combined with paralysis of other parts, when it may be reasonably referred to a cerebral origin. Thus, in one case which came under my observation, the paralysis attacked the muscles supplied by the third nerve of one eye, and then extended to those of the other, which was succeeded by amaurosis of both eyes, the paralysis of the muscles ceasing, but vision remaining permanently destroyed. In other instances, however, it would appear to be merely a local affection, and originating probably in some disordered action of the trunk of the nerve after it has passed out of the cranium. I have known it to result from a blow received on the orbital region. In these latter cases, the patient's health will not be much affected. Sometimes, this disease appears to come on without any obvious cause, and it is observed to attack all sorts of persons, as well those of a delicate and spare, as those of a more robust and vigorous constitution.

Dr. Mackenzie thinks that this affection is sometimes of a rheumatic character, being excited by exposure to cold, in the same way as paralysis of the muscles of the face is frequently excited. I confess that I have not seen any cases that appeared to favour this view. The branches of the motor oculi nerve are very differently situated to those of the portio dura, the latter being much exposed to the action of cold, as from a side-wind and the like, which is not the case with the former.

*Treatment.*—With respect to the treatment of this affection, if the case be of recent origin, and occur in a strong person, we should commence with bleeding freely from the arm, afterwards applying cupping-instruments to the temple or nape of the neck, with counter-irritants to the



neighbouring parts, the internal administration of mercury, and occasional purgatives. In more delicate individuals, and in such as have not exhibited symptoms of plethora, either general or local, or in whom the disease has been somewhat protracted, I have found a perpetual blister to the temple, with the internal exhibition of mercury, to answer very well. Generally speaking, this treatment is successful; but, if the affection have assumed a chronic character, or if it be connected, as it sometimes is, with organic disease of the brain, the chances are less favourable. I have observed several instances in which, combined with antiphlogistic treatment, mercury had been freely exhibited without producing its peculiar effect, and that, in such cases, no impression has been made on the disease. I have also noticed, that, in cases in which recovery was brought about, the improvement usually commenced from the first appearance of the mercurialization of the system; and hence I have been led to infer that mercury is by far the most efficient agent in the cure of this paralytic affection of the nerves of the eye-ball. In cases in which the treatment I have mentioned has failed to produce any beneficial result, it may be proper to advise a complete change of locality, and, when practicable, a sea voyage, or a protracted residence in a warmer climate.

CASE I.—Mary D., æt 37, was admitted an out-patient of the Eye Hospital, 23rd of October, 1838. She stated that four days since, on awaking in the morning, she was unable to elevate the upper lid of the right eye, which had been previously unaffected. She had been frequently troubled with giddiness, and some pain in the head. She had likewise a good deal of twitching about the muscles of the face of the opposite side, which had existed for some time past.

There is now a complete drooping of the superior eye-lid, and scarcely any power to enable her to raise it. The lid being raised with the finger, and being told to move the eye about in various directions, she is unable to do so, except outwardly. The pupil is dilated and immovable. Vision is not much impaired, and no other mark of disease is discernible. She was ordered to be bled from the arm, *ad deliquium*; to take a calomel and jalap powder, occasionally, and ten grains of blue pill night and morning.

26th. The giddiness is removed. She has some pain in the eye on moving it. With some exertion, she can now elevate the margin of the lid to the upper part of the pupil. The motions of the eye-ball are still much impaired. The pupil is somewhat less dilated. Ordered a blister to the temple, to be kept discharging with the Ung. Lyttæ. Continue the blue pills as before. A dose of sulphate of magnesia occasionally.

December 4th. The mouth has been kept sore for some time. She is much

improved. Can now elevate the upper lid almost as well as before, but cannot keep it up very long at a time. The motions of the eye-ball are now accomplished with some facility, and the pupil is more contracted.

From this time she gradually recovered, and was soon able to be discharged.

CASE 2.—Mrs. F., *æt.* 40, applied to me on the 27th of November last. She stated that about a month since she received a blow on the right eye, which rendered her faint and insensible for a short time. When she recovered, she found that she was unable to raise the upper eye-lid, in which condition she has continued up to this time.

Both eye-lids are now perceived to be almost in contact; the upper completely covering the cornea. She has not the least power over the levator palpebræ muscle, and, consequently, if she desires to expose the eye, she is compelled to push up the superior eye-lid with her finger, on the removal of which it again instantly drops. The winking motions continue regularly with those of the opposite eye. On separating the lids, the pupil is observed to be a good deal dilated, but her vision is not much impaired. She is able to discern any object with this eye; but, after looking for a few seconds, she becomes sick and giddy, and can see no longer. She cannot move the eye-ball either upwards, downwards, or inwards. The external direction is the only one that can be effected, and this is its usual position.

She has experienced much pain about the forehead; first over the right eye and since over the left. Occasionally she is troubled with vertigo. In other respects her health is good, although she is evidently a delicate person. Ordered *Empl. Lyttæ nuche applicand.* *Hydrarg. Submur. gr. iv. ter in die sumend.*

December 10.—For several days past, she has been suffering from *ptyalism*, her mouth being very sore, and discharging a watery fluid; she then left off taking the calomel. The *ptyalism* is somewhat abating. There is a slight improvement in the action of all the paralyzed muscles. Ordered to take two purging pills, containing two grains of calomel, every or every other night. A blister to be applied to the temple of the affected side, and the part to be dressed occasionally with *Ung. Lyttæ*.

January 10.—A very marked improvement is now observable. The upper lid is raised almost to the same extent as that of the other eye. She can move the eye-ball, too, in every direction, but not quite to the full extent; it is still slightly turned outwards; the pupil is also more expanded than natural, but is considerably smaller than at first. Vision improves; the pain in the head has disappeared; her mouth has continued slightly sore up to this time, and the blister has continued to discharge. Continue the pills, and let the blister be kept open.

From this period her recovery was rapid, and is now complete. It is difficult to decide whether the symptoms of this case arose from an affection of the nerve within the orbit, or of the brain about its origin, or in the course of the nerve within the cranium. In every case of this description that I have met with, (and

I have seen a moderate number of cases,) the symptoms always indicated more or less cerebral mischief. I can scarcely regard this as an exception.

It is difficult at present to say how far the new operation of dividing the tendons may be applicable to cases in which the opposite muscles are actually paralyzed. I was lately consulted by a gentleman who had been for several years the subject of a paralytic affection of all the branches of the third nerve, in whose case I advised, after the failure of general remedies, as a matter worthy of trial, first the division of the external rectus, and afterwards, if the previous operation was successful, the removal of a portion of the integument of the superior lid. He has not as yet, however, made up his mind to submit to the operation.

#### PARALYSIS OF THE SIXTH NERVE.

It sometimes happens that the external rectus muscle alone is the seat of paralysis; the eye is, of course, then turned inwards, and the patient is unable to direct it outwards, even when the opposite eye is closed. This affection is apt to be overlooked in its origin, or only regarded as ordinary strabismus, so that the paralysis becomes confirmed and is irremediable, except, perchance, it might be benefited by the division of the internal rectus, which would be somewhat doubtful, inasmuch as there would still be other antagonist powers to keep the eye directed towards the inner canthus.

It is remarkable that these cases of paralysis do not appear to throw any light upon the obscure points connected with the physiology of the nerves and muscles of the eye-ball. It might be supposed that in a case in which all the muscles supplied by the third nerve were paralyzed, it would be a very easy matter to make out the functions of the other nerves. Such, however, is not the case. It is true that we see clearly enough what is the function of the sixth nerve and of the muscle to which it is distributed; but, with respect to the fourth nerve, and the muscle which it supplies, nothing certain is yet elicited. We see only one movement and that is directly outwards, effected by the external rectus. Whether or not the fourth nerve is generally implicated in the affection, when the third is the subject of paralysis, we can only conjecture. Such, however, is not an improbable supposition, when we recollect that the origins of the two nerves are not very remote; and I think I have somewhere met with

the remark, that the fourth might be almost regarded as little more than a branch of the third nerve.

Dr. Jacob, in a highly-interesting paper on the paralytic affections of the eye, which has recently appeared in the "DUBLIN MEDICAL PRESS," has drawn attention to a peculiar motion which he has observed in some cases of paralysis of the orbital nerves. He has noticed a semirotary movement of the globe from within outwards, and this motion he presumes to be caused by the action of the trochlearis muscle. This movement I have lately had an opportunity of witnessing in a case in which the whole of the muscles of the eye-ball were apparently paralyzed, every movement being totally suspended, the levator palpebræ as well as the iris being likewise paralytic, with the exception of the semirotary motion referred to by Dr. Jacob. It is worthy of remark that in this case, when the power of motion had returned to all the muscles, this peculiar movement was no longer noticeable. This semirotary motion, too, I ought to have remarked, was only observed when the patient was told to endeavour to move his eye about, the organ being at all other times perfectly passive. I am disposed to attribute much weight to the opinion of this able surgeon, but still I must be permitted to think that there are many objections to this view; indeed, I doubt if this movement can be referred to any other cause than that of an imperfect action which the muscles, though almost perfectly paralyzed, may still retain. Moreover, we find that when the muscles of the third nerve are paralyzed, the eye is constantly turned towards the outer canthus by the external rectus; and we may presume that, in case both the third and sixth nerves are paralyzed, such a power as this, which is attributed to the trochlearis, would give a distinct direction to the eye, and which would be, to a certain extent, permanent. That a movement of this description, observed only in a case of extensive disease, and ceasing to be noticed on the restoration of the impaired functions, can be fairly regarded to be one of the natural actions, is, I confess, more than I can at present bring myself to believe. It would be difficult also to imagine that a muscle, so curiously contrived and supplied with a separate nerve, as the trochlearis is, should be destined to fill no other office than that of producing a semirotary motion of the eye,—a motion, too, which is not observable except when the muscles at large are completely paralyzed!

I am not, however, about to enter upon the consideration of this

physiological problem, merely remarking that, notwithstanding the multiplicity of observations and the numerous experiments (generally unsatisfactory and frequently contradictory) that have been made, I think that the simple explanation I have offered is open to as few objections as any which I have yet met with. It is based upon the uniformity in the direction of the two eyes to which I alluded in the section on strabismus, and which I consider to be effected by the peculiar arrangement and independent actions of the muscles and their nerves. By these, two distinct and independent sets of motions are produced. There is a class of associated movements in which the two eyes are directed forwards, inwards, upwards, and downwards; and there is another class in which the movements are dissociated and the eyes directed laterally. As these are distinct and independent movements, so they are accomplished by two distinct classes of muscles, and these muscles have distinct and independent nerves. Those movements in which the eyes are directed forwards, inwards, upwards, and downwards, are, I conceive, effected by the muscles supplied by the third pair of nerves; whilst those movements in which the eyes are directed laterally (one eye being turned outwards and the other inwards), are effected by the muscles supplied by the sixth and fourth pairs of nerves, viz., the external rectus and the trochlearis.

## CHAPTER X.

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### [ DISEASES OF THE EYE-LIDS.

**AFFECTIONS** of the eye-lids, as well as being sometimes productive of considerable deformity, occasionally interfere with the integrity of vision, inasmuch as they are very apt to extend, through the medium of their conjunctival surface, to the textures of the globe. Thus, as I have before pointed out, it is very common to find that inflammation and opacity of the cornea have their origin in a morbidly vascular condition of the lining membrane of the lids, and that if the latter be remedied, the healthy state of the former will often be restored. In some instances, likewise, morbid conditions of the lids act mechanically so as to injure the eye itself, as in the case of entropion; in which disease, the margin of the lid becoming inverted, the cilia are directed against the conjunctival covering of the globe, and thus inflammation and opacity of the most inveterate character are often established. So that it will be seen from these illustrations alone, that our knowledge of ophthalmic surgery would be very imperfect, if the morbid conditions of the palpebræ were to be passed over without an especial notice.

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#### SECTION I.

##### BLEPHARITIS IDIOPATHICA, OR PHLEGMONOUS INFLAMMATION OF THE PALPEBRÆ.

Inflammation of the eye-lids is very commonly observed to attend some of the more violent forms of ophthalmia, and more particularly the purulent

variety ; but the disease of which we are now to treat is an idiopathic affection, and confined, or nearly so, to the palpebræ.

*Symptoms.*—It is most frequently witnessed in children, commonly attacking the palpebræ of only one eye, and the upper eye-lid is more considerably affected than the lower one. There is much redness and tumefaction of the lid, the swelling being so great as to render it difficult to uncover the eye ; but when this is effected, we then perceive that the conjunctiva is but slightly inflamed, and that the substance of the lid is the part chiefly affected. There is usually some tenderness to the touch and a feeling of increased heat. In some instances, after a certain period of time, and particularly if the case have been unattended to, the suppurative process commences, a throbbing sensation is complained of, and fluctuation becomes evident to the touch. Sometimes the matter is evacuated from the inner surface, but, more commonly, it is discharged externally. This affection is generally supposed to be produced by exposure to cold, and sometimes appears to be the result of injury.

*Treatment.*—The treatment of this disease is the same as that of phlegmonous inflammation in general. In slight cases, probably, an evaporating lotion may be alone requisite as a local application ; if the morbid action be of a more intense character, then leeches may be applied to the cutaneous surface. The general treatment should consist of mild purgatives, with an abstemious regimen. Should suppuration seem inevitable, then warm fomentations and poultices should be resorted to. If the matter be not early evacuated by the natural efforts, a free incision must be made so as to occasion its discharge, and the case treated as one of ordinary suppuration.

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## SECTION II.

### ERYSIPELATOUS INFLAMMATION OF THE LIDS.

The palpebræ are also frequently the seat of erysipelatus inflammation. More commonly, erysipelas of the eye-lids is witnessed in conjunction with a similar condition of the head and face ; but in some cases the palpebræ alone are thus affected, and often those of one eye only are the

seat of the disease. There is usually considerable swelling, so that the lids are not easily separable; they have also a rose-coloured tinge, which vanishes when pressure is made with the finger, but immediately reappears on its removal. There is a feeling of heat, but not much pain complained of; an œdematous condition of the subcutaneous cellular texture is also frequently noticed, and sometimes vesicles are formed on the surface, which ultimately burst and evacuate the contained fluid. In more severe cases, suppuration and sloughing of the cellular texture take place, and sometimes large quantities of disorganized membrane are evacuated with the pus, and much thickening, contraction, and adhesion of the various textures are produced, and considerable deformity is thus occasioned.

In erysipelatous inflammation of the palpebræ, there is generally some extension of the disease to the conjunctiva, the Meibomian glands, and the lachrymal sac; and hence there is usually a certain amount of lachrymation, agglutination of the margins of the lids, and a mucous secretion from the inner canthus.

Erysipelatous inflammation is usually thought to be induced by some peculiar atmospheric condition, or by contagious influence, acting upon persons predisposed from derangement of the stomach and bowels. In the commencement of the disease, there is therefore usually a considerable amount of fever present, as indicated by occasional rigors, headache, furred tongue, and the like, afterwards succeeded by a state of depression and exhaustion. Slight attacks are also occasionally induced by the bites of insects and the application of leeches.

*Treatment.*—As the existence of this disease generally indicates some vitiated condition of the alimentary canal, the treatment should, in the first instance, be more especially directed to that portion of the system. With that view, an emetic should be first ordered, and this followed up by the administration of mild purgatives. When this has been accomplished, then the exhibition of quinine should be enforced. It is rarely necessary to bleed, except in very plethoric persons, or in cases in which we may anticipate cerebral mischief; neither is the employment of leeches generally to be commended. Evaporating lotions are often serviceable, and in slight cases are frequently the only local applications necessary. The use of flour as a local remedy is resorted to by many practitioners. The nitrate of silver, either in substance or solution, is



likewise a useful application. Some surgeons scarify the skin of the lids very freely; some, again, recommend the inflamed surface to be slightly punctured all over; and others, in severe cases, in which suppuration and sloughing are likely to occur, advise deep incisions into the cellular texture. Mr. Lawrence has related several cases of this last description, which were beneficially treated by extensive transverse incisions across the lids.

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### SECTION III.

#### OPHTHALMIA TARSI.

Sometimes the tarsus is almost exclusively the seat of inflammation. The morbid action is supposed to commence in the Meibomian glands, and extends to the tarsus, conjunctiva palpebralis, and ciliary margins. In this affection the patient usually complains of a pricking or itching sensation in the margins of the lids; and hence the disease has been called *psorophthalmia*. There is also usually a considerable discharge of the Meibomian secretion, which causes the tarsal margins to be adherent, and renders their separation a matter of difficulty after the patient has been asleep. If the conjunctiva be at the same time affected, then there will be likewise some intolerance of light and an increased flow of tears.

Psorophthalmia is often a sequel of measles, or some other exanthematous disease. It is also frequently produced by changes of temperature, exposure of the eyes to irritating vapours, working by gas-light, and very frequently from a want of cleanliness.

*Treatment.*—The treatment of this affection is very simple. When a case is witnessed in the early stage, the free use of tepid water, or a collyrium of the saturnine lotion, with distilled vinegar, or liquor ammoniæ acetatis,\* is found to be an agreeable application; and the zinc ointment may be smeared upon the edges of the lids at bed-time. Care must be taken to wash away the morbid secretion which usually collects about the tarsal margins in the morning. This is easily accomplished with a piece of sponge dipped in warm water. If the secretion be not properly removed, the other remedies will not come into contact with the diseased

\* See Formulæ, p. 10.

surfaces, and, consequently, will be productive of little or no benefit. Moreover, if forcible attempts are made to separate the adherent tarsal margins, without this necessary precaution, the cilia will be plucked out, and increased irritation and a certain amount of deformity result.

If the disease have reached the chronic stage, then the applications to be employed must be of a more stimulating character, such as a solution of the sulphate of zinc, or of the sulphate of copper, for an eye-lotion, and the red precipitate ointment as an unctuous application to the margins of the lids.\* The sulphate of copper, in substance, may also be occasionally applied to the inner surface of the lid when the conjunctiva is preternaturally vascular. In every stage, I need scarcely add, that proper attention should be directed to the general health of the patient, and occasional purgatives ordered when necessary.

*Tinea tarsi.*—When the disease just described is of a chronic character, and attended with pustules, or small abscesses in the ciliary margins, it is named *tinea tarsi*. The affection thus termed, as I have just said, differs in no other respect but the existence of these pustules, and requires precisely similar treatment.

*Lippitudo.*—Chronic inflammation of the tarsal margins having existed for a considerable period, is apt to be succeeded by a degree of thickening and ulceration, and consequent escape of the cilia. To this condition, the term *lippitudo* is applied, and the eye-lids present a very unsightly appearance when thus affected, for the margins, instead of being angular, are rounded off, have a raw and ulcerated aspect, and the lashes, or many of them, having fallen out, altogether occasion a considerable amount of deformity. Sometimes the apertures which give exit to the Meibomian secretion are completely obliterated, and very frequently there is a degree of eversion of the tarsal margins, which no longer retain, but permit, the discharge of the tears over them and down the cheek. On other occasions, the opposite state, or that of inversion, succeeds, and produces considerable irritation of the globe of the eye.

In many cases, when the affection has proceeded very far, but little good can be done. In some, however, a partial improvement may be effected by the regular application of the more powerful stimulants, such as the sulphate of copper and nitrate of silver, either in substance, strong

\* See Formulæ, p. 17.

solution, or in the form of ointment. Some advise the extraction of the cilia, when there is ulceration commencing, considering that there will thus be a better chance of their reproduction than if permitted to fall out spontaneously.

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## SECTION IV.

## ECTROPION.

I have before stated, that one consequence of chronic inflammation and ulceration of the ciliary margin is that disagreeable condition named *ectropion*, or eversion of the lid.

Ectropion is often an accompaniment of purulent ophthalmia, particularly in infants. But, in this case, the eversion is produced by a mechanical cause, viz., the pressure of the swollen and infiltrated sub-conjunctival cellular tissue, and is therefore more likely to be successfully treated than when it is the result of chronic inflammation and ulceration of the tarsal margins. Indeed, in the former case, it readily disappears under the treatment usually adopted, particularly if it be of the stimulant character. Eversion from this cause is more frequently observed in the upper lid, because in purulent ophthalmia that is more extensively affected than the lower one, although both are usually implicated.

Ectropion, however, as I have said, is commonly attributable to chronic inflammation and ulceration of the margin of the lid; and as the lower lid is more frequently the seat of chronic inflammation than the upper, we find the former more commonly affected with eversion. Indeed, there is another circumstance which predisposes the lower lid to this affection, from which the upper is exempt, viz., the excoriated condition of the integuments of the cheek occasioned by the incessant flow of tears. The skin of the lower lid and cheek is apt to become contracted from the irritation thus caused, and this increases the eversion and exposure of the conjunctival surface by dragging the lid downwards. From the constant exposure of the conjunctiva to the action of various irritants in this condition, it frequently becomes thickened and degenerate, loses its sensibility, and acquires more of the character of the common integument.

*Treatment by Caustics.*—If the eversion of the lid be not very considerable, it will usually be remedied by the application of some escharotic or caustic substance to the conjunctival surface. If there have been cicatrization of the external surface of the lid to such an extent as to produce a slight eversion of the tarsal margin, then a similar condition of the internal surface, produced by the caustic application, will tend to correct the deformity, and, if carried too far, will bring about the opposite state, or that of inversion. The nitrate of silver will, in slight cases, probably be sufficiently powerful, whilst, in those which are more aggravated, it will often be necessary to use sulphuric acid or caustic potass. The latter substances require to be used with great caution, or otherwise more harm than good will be likely to result. If the caustic application do not succeed, it is then necessary to remove a portion of the thickened conjunctiva, which may be dissected out with the aid of forceps and curved scissors, care being taken not to remove too large a portion, so as to occasion inversion.

*Operation.*—In some cases it becomes necessary to remove a triangular or V-shaped portion of the substance of the lid. Where the eversion is to such an extent as to be incapable of being remedied by the means previously recommended, this operation should be resorted to. The central portion of the lid should be selected for removal. After having excised a sufficient portion to produce the desired effect, the edges of the wound are to be brought together and retained by sutures.

The most unmanageable cases of eversion are those which succeed to the cicatrization of burns, wounds, and ulcers. The deformity witnessed in some of these cases is very great. Thus, Cloquet relates a case in which the margin of the inferior lid was drawn down almost to the upper lip. In this state the lid is usually adherent throughout to the integuments of the cheek, and the first point to be aimed at is the liberation of it from its unnatural situation, which can only be done by a careful dissection. This being effected, it is necessary further to remove a portion of the conjunctival surface, or in some instances to extirpate a V-shaped portion from the centre of the lid, and then to bring the edges of the wound together by sutures. In some cases, doubtless, these operative proceedings are serviceable, yet they rarely produce more than a partial improvement, for the sutures frequently tear away, and the purposes of

the operation are to a certain extent frustrated. The hare-lip suture should be preferred.

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## SECTION V.

## ENTROPION.

The opposite condition of the lid, that of inversion, is a much more troublesome and more serious affection than eversion. Entropion, or inversion of the lid, is brought about in two or three different modes. It is a very common result of long-continued ophthalmia affecting elderly persons. Thus, after operations for cataract in old people, who have suffered much from inflammation, and have had a good deal of intolerance of light, the undue action of the orbicularis, acting more especially upon the edges of the lids, produces inversion of the ciliary margins, and of course of the cilia themselves. This kind of entropion is the most manageable. It should not be neglected, or otherwise much danger to vision may accrue, as the inverted cilia are continually rubbing upon the inflamed eye-ball, with the effect of adding to the irritation, and perhaps tending to produce an irremediable opacity of the cornea.

When entropion arises from this cause, the eye-lids exhibit no mark of disease, no thickening or contraction of their substance; but there is generally a relaxed state of the integuments, which appear to be superabundant. If the lower lid be drawn down with the finger (for the inversion is generally confined to the lower lid in this case), the ciliary margin resumes its natural position, and the cilia are directed outwards, and this will continue to be the case for some time; but as soon as the orbicularis begins to act the edge of the lid is again inverted.

*Operation.*—Inversion of the character just described may be remedied by the removal of a portion of skin from the affected lid, and which, as I have said, is in general superabundant. This may be effected either by the excision of a portion of integument, or by the production of a slough or eschar. Excision is the most speedy, and perhaps most effective mode, of remedying the defect in question. A portion of integument is to be pinched up between the finger and thumb; when a certain portion is by this means secured, the edge of the lid is brought into its natural position,

and we thus ascertain the exact portion necessary to be removed. If less than this amount of integument be excised, it will be insufficient for the intended purpose, and there will still be a certain degree of inversion; and, on the other hand, if too much is removed, then a degree of eversion will be produced, so that some nicety is requisite in determining the precise quantity to be excised. The portion of integument, previously raised by the entropion forceps, may be dissected out, either with a scalpel or sharp scissors, and the edges of the wound brought together by sutures and the usual dressings.

*Caustics.*—If the escharotic plan be resorted to, either the caustic potass or sulphuric acid may be employed. The potass is perhaps more manageable, and quite as efficacious as the other: it is to be drawn across the integument of the lid, (which should be previously moistened,) a little below its margin, in a transverse direction, two or three times, until it has sufficiently acted upon it, so as slightly to abrade the cuticle. An eschar is afterwards produced, and when the healing process is complete, a considerable contraction of the skin will be found to have resulted, which will have effectually remedied the inversion. If the sulphuric acid be chosen, a piece of stick, pointed, is dipped into it, and then drawn across the skin of the lid in the same way as the potass. Care must be taken to limit its application, or otherwise too great an extent of ulcerated surface may be produced.

A less manageable form of entropion is that which is a consequence of chronic inflammation of the tarsal margins. In this variety of the disease, the eye-lid is considerably altered in character, the tarsal cartilage being thickened, contracted, and inverted. Many of the cilia are frequently lost from ulceration of the tarsal margins, whilst those which remain are directed inwards upon the globe, causing inflammation and opacity of the cornea. If this condition continue without proper means being adopted to remedy it, the entire cornea frequently becomes vascular and opaque, and the conjunctiva thickened, cuticular, and insensible.

*Operation on the Tarsus of the Upper Eye-lid.*—Entropion of this latter character, especially when affecting the upper eye-lid, cannot usually be remedied by caustic applications, or by the removal of a portion of integument. It is the tarsal cartilage which is in this case the seat of the disease; it is thickened, constricted, and bent inwards upon the eye-ball; and the object which the surgeon has in view is to remove this constrict-

tion, and thus remedy the unnatural condition of the lid, which cannot be done by any operation merely on the integument.

The treatment of entropion of the upper lid is a subject which has exercised the ingenuity of many members of our profession from the earliest times. More recently the subject has been practically investigated by Sir P. Crampton, Mr. Guthrie, and others. The operation most frequently practised of late years is that known as Crampton's. It consists in making a perpendicular incision at both angles, to the extent of about one-fourth of an inch, by means of a sharp-pointed bistoury, which is pushed through the substance of the lid from within outwards. In making the incision at the internal angle, it is desirable to avoid the lachrymal puncta. The effect of this operation is to take off the pressure produced by the constriction of the lid; but this would be but a temporary relief if the incisions were allowed to heal too soon. To prevent this it is found that, in addition to the operation already mentioned, the best plan is to excise a portion of the skin of the lid in the manner described as proper for the treatment of entropion from relaxation of the integuments, then to bring the edges of the wound together by sutures, and (by the aid of the sutures, attached to the brow by strips of adhesive plaster) to cause the everted lid to be suspended for a period of eight or ten days, so that granulations may arise in the edges of the perpendicular incisions, and the healing process be prevented from taking place too rapidly. When at length the divided portions of the lid are reunited, the constriction of the tarsus is found to be much diminished, and the direction of the ciliary margins nearly natural.

*Excision of the tarsal margin.*—Mr. Wilde, in an admirable essay on this subject, recently published in the Dublin Medical Journal, shows that the above operation is by no means uniformly successful. He has met with several cases in which it had completely failed. Such cases were also known to Mr. Saunders, who therefore was led to prefer the excision of the tarsal margin, a practice which has likewise been adopted by Professor Jäger. Mr. Wilde has given an account of several interesting cases in which, after the failure of Crampton's operation, the patient was effectually relieved by the excision of the tarsal margins. Hence he is disposed to prefer this operation to that of incision; and has given some excellent rules for its efficient performance. For this purpose "a horn or ivory spatula, of suitable size and shape, is

to be introduced under the upper lid, which steadies it, and upon which the incision into the ciliary margin is to be made. Mr. W. uses a small fine scalpel, more than usually curved towards its point, and having a small indenture in its back, towards the extremity, with which an incision is to be made through the external integument, parallel with, and about the eighth of an inch behind the ciliary margin of the lid; commencing in the right eye at the external commissure and ending at the punctum, and vice versa in the left. In this incision, which may be varied in its extent from the edge of the lid, according to the quantity of external integument which it may be desirable to remove, the fibres of the orbicularis muscle must be in part divided along their longitudinal course, for the cartilage should be reached at one cut; and the extremities of the incision should likewise curve abruptly downwards, in order to leave no nodulated or rugged margin to the lid in the subsequent process of healing. Having proceeded thus far, the spatula may be removed, and the surgeon then lays hold of the external angle of the margin of the lid with a fine toothed forceps. Standing on one side of the patient, so that the parts may be seen in profile, with the knife held in that position that its blade crosses obliquely the margin of the lid, from the external tegumentary incision to a point a little internal to the centre of that flat surface which the lids present to each other when closed, it is made to traverse, with its back kept towards the operator, the whole extent of the part to be removed, while the forceps retained in the left hand draws forwards the slip containing the eye-lashes, till the incision is complete. By this means there is nothing whatever removed from the length of the cartilage, and the cilia, by not being inserted in, but *lying on* the cartilage, are completely removed, and by thus taking off the slip in profile, we see exactly how much we are removing, and can also guard with greater accuracy the punctum. After the bleeding has ceased, the operator must examine if there be any ciliary root remaining, which is easily seen, as it is always of a dark colour. Such roots, if observed, should be laid hold of with a fine toothed forceps and removed along with some of the surrounding cellular substance, by the scalpel or curved scissors. Two or three points of suture, passed by means of a fine sewing needle, are then to be passed first through the thin margin of the cartilage, and then including the external integument which is thus brought in accurate apposition with the conjunctival lining of the lid. By inserting the central one first, and,



through its means, holding the lid slightly everted, the two others can be passed with great facility; they are then cut off close, and removed about the end of the third day, when the wound is generally healed and no further trouble experienced."\*

Sometimes entropion is produced by means of a burn or scald of the conjunctival covering of the lid, or by lime or mortar coming in contact with it. In some cases, too, as I formerly stated, it is produced by the use of the nitrate of silver as a remedial agent. In such cases excision of a portion of the skin of the lid, or its destruction by the caustic potass, will usually remedy the inversion.

## SECTION VI.

### TRICHIASIS.

In some instances the cilia alone are the subject of inversion, whilst the margin of the lid maintains its natural position. Occasionally the cilia exist in a double row, one being directed naturally and the other turned inwards, so as to irritate the eye. When there is a double row the affection is termed *distichiasis*. Inversion of the cilia is sometimes witnessed without there being any visible change in the structure of the lid, although it is often connected with chronic inflammation or ulceration of the tarsal margin.

There are two kinds of treatment to be advised, according to the peculiarity of the individual case. The most simple proceeding consists in plucking out the inverted lashes with a suitable pair of forceps. This, however, is but a palliative, as the cilia shortly become reproduced. Some individuals are satisfied with this, and prefer having them extracted occasionally, to submitting to any operation on the lid itself. In some instances, after repeatedly removing them in this manner, they resume the natural direction. If this should not be so, and the patient is desirous of some further treatment, then the production of a small eschar on the skin of the lid, very near to the ciliary margin, so as to produce slight eversion, may be serviceable. In very unmanageable cases, the

\* Dublin Medical Journal, vol. xxv. p. 125 et seq.

excision of the ciliary margin has been deemed advisable, so as to remove their roots, and thus prevent the reproduction of the lashes. The late Dr James Hunter advised the use of caustic points, so as to destroy the roots of the cilia.

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## SECTION VII.

### LAGOPHTHALMOS.

This disease consists in a shortening or retraction of the upper lid, and is commonly the result of cicatrization after a wound or burn, or sometimes of suppuration within the orbit. In this condition the upper lid is more or less everted, tucked up to the edge of the orbit, and cannot be drawn down so as to meet the lower one; and the consequence is that, under all circumstances, the eye is left unprotected and exposed to various sources of irritation.

In this condition, considerable improvement may often be effected by liberating the lid, or so much of it as may remain, from the margin of the orbit. For this purpose an incision should be carried quite across the cicatrized part, with a fine scalpel, at a short distance from the ciliary margin. The lid must then be separated from any adhesions it may have formed with the subjacent parts by a careful dissection, and the ciliary margin brought down so as to meet the margin of the lower lid. A portion of skin is then to be removed from either the temple or forehead, and transplanted into the opening made by the removal of the lid from the edge of the orbit. The size and figure of the portion of skin to be removed should be previously marked out, and care taken that it correspond with the gap in the eyebrow, which it is intended to fill. Operations of this description have been successfully performed by Dr. Fricke, Dr. Mackenzie, Mr. Tyrrell, and others.

Mr. Wharton Jones recommends an operation under these circumstances, which, if equally successful, is to be preferred, on account of its greater simplicity and less painful character. "The peculiarity of the plan consists in the following particulars. The eye-lid is set free by incisions made in such a way, that when the eye-lid is brought back into

its natural position, the gap which is left may be closed by bringing its edges together by suture, and thus obtaining immediate union. Unlike the Celsian operation, the narrower the cicatrice, the more secure the result. The flap of skin embraced by the incisions is not separated from the subjacent parts: but advantage being taken of the looseness of the subcutaneous cellular tissue, the flap is pressed downwards, and thus the eye-lid is set free. The success of the operation depends very much on the looseness of the cellular tissue. For some days before the operation, therefore, the skin should be moved up and down in order to render the cellular tissue more yielding."

The following case is given in illustration of Mr. Jones's practice.

CASE.—A woman, aged twenty-four, had her face much scarred. Both eye-balls were quite exposed, on account of shortening and eversion of the upper eye-lids. On the left-side, the eversion was not so great as on the right. On this side, the ciliary margin of the tarsal cartilage corresponded to the edge of the orbit, and the opposite margin of the cartilage occupied the usual position of the ciliary margin; so that when an attempt was made to close the right-eye, it was the orbital margin of the tarsal cartilage which was pressed down. There was some degree of shortening and eversion of the left lower lid. The patient saw very well with the right eye; but with the left, on account of opacity of the cornea, she did not see well enough to recognize a person. At the age of one year and three months she fell into the fire, and had her face severely burned, which was the cause of the state above described.

Two years before, she had an operation performed on the left eye, and derived advantage from it. It is probable, however, that the eversion only had been lessened by the operation, for the shortening of the upper eye-lid was still very great.

On the 22nd of February 1836, Mr. J. operated on the *left* upper eye-lid. Two converging incisions were made through the skin, from over the angles of the eye upwards to a point where they met, somewhat more than an inch from the adherent ciliary margin of the eye-lid. By pressing down the triangular flap thus made, and cutting all opposing bridles of cellular tissue, but without separating the flap from the subjacent parts, the operator was enabled to bring down the eye-lid nearly into its natural situation, by the mere stretching of the subjacent cellular tissue. A piece of the everted conjunctiva was snipped off. The edges of the gap left by the drawing down of the flap, were now brought together by suture, and the eye-lid was retained in its proper place by plasters, compress, and bandage.

During the healing of the wound, a small piece of the apex of the flap, which had been somewhat separated from the subjacent parts, sloughed. By the first of April healing had taken place, and the eversion completely cured. The


cicatrice where the part had sloughed was pretty broad. When the bandages were first left off, the eye-lid was so elongated, that if the lower lid had not also been shortened, the eye would have been entirely covered. After leaving off the bandages some shortening took place from contraction, not of the cicatrice, but of the skin. Being no longer on the stretch, the skin assumed, as it contracted, more of its natural appearance.

About the middle of March, the right upper eye-lid was operated upon. The incisions were made in a similar way, except that they did not meet in a point, a space being left between their extremities to the extent of about one-sixth of an inch, which was divided by a transverse cut. By the stretching of the subjacent cellular tissue, the flap was drawn down, and the eye-lid elongated so much that it covered the eye entirely: but in consequence of the long continued displacement of the tarsal cartilage, the ciliary margin of it did not come into contact with the eye-ball. No further interference was attempted except that a piece of the everted conjunctiva was removed, and with it a bit of the tarsal cartilage. From the surface of this wound there sprung out a small soft fungus, which was cut off with the scissors, and the root touched with the lunar caustic pencil.\*

Mr. Jones adds, that this operation was repeated by M. A. Bérard, in 1837, without success, and by M. Velpeau, in 1838, successfully in one case, and unsuccessfully in another, in which erysipelas came on. The success attending such operations is usually limited and partial: they should not be entered on too sanguinely, for disappointments are frequently encountered.

Sometimes inability to close the lids arises from paralysis of the orbicularis muscle. In this case, although the effect is nearly the same, there is no shortening or other disease of the substance of the lid. The mischief arises solely from some morbid condition of the nervous branches which supply the sphincter muscle of the eye-lids. When the inability to close the lids arises from this cause, there is a better chance of remedying it. Such cases are often successfully treated by a combined antiphlogistic and mercurial treatment.

\* Manual of Ophthalmic Medicine and Surgery, page 419.



simply by raising the drooping lid ; but this does not prevent it from being regarded as a source of anxiety and an annoyance. When the lid is raised from mere relaxation of the integuments, if a portion of skin is drawn up between the thumb and forefinger, and the patient told to look up, the eye-ball will be properly exposed by the action of the levator palpebrae muscle ; so that the remedy for this species of ptosis is to remove so much of the superabundant integument as will permit of elevation of the lid. No precise direction can be given as to the amount of integument to be excised, as all depends upon the relaxation of the muscle in the individual case. A transverse fold of the skin is to be laid up with the finger or suitable forceps, which may then be dissected with a scalpel or curved scissors, the edges of the wound being brought together by sutures, and proper applications employed to promote their union.

When ptosis arises from paralysis, of course it is then produced either by paralysis of the motor oculi nerve, or of the branch of that nerve which is distributed to the levator palpebrae muscle, or it may arise from a lesion of the brain itself. The treatment of this case, in the first instance, is as I before explained in speaking of paralysis of the orbital nerve, and consists in general and local bleeding, counter-irritation, purgatives, and, finally, in the liberal exhibition of mercury, so as to produce

and in such a case it would be proper to adopt the plan recommended by my colleague, Mr. Hunt.

**CASE.**—A man who had an encysted tumour of the orbit applied for its removal. Mr. Hunt, after removing the tumour, found that the levator palpebræ had been so much injured as to leave it perfectly powerless. With a view of remedying this defect, he first of all excised a portion of skin in the manner usually recommended, without benefit; he then proceeded to remove another portion of integument, and that so high towards the brow as to bring the lid under the influence of the occipito-frontalis muscle, and it afterwards was found that the patient could elevate the lid very considerably by the agency of that muscle.

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## SECTION IX.

### TUMOURS OF THE LIDS.

Various tumours are occasionally found affecting the eye-lids. Some of these are seen only on the margin of the lids, whilst others are situated within their substance. I shall first notice those which are observed in the ciliary margins.

*Hordeolum*, or *stye*, is a small inflammatory tumour situated on the edge of the lid, which generally suppurates and looks very much like a little boil. There is often considerable pain and irritation experienced, owing to the high degree of sensibility with which the margin of the lid is endowed. An evaporating lotion may be prescribed in the first stage. So soon as suppuration has commenced, then the use of warm fomentations and poultices is indicated, and an early evacuation of the matter should not be omitted.

Sometimes a chronic tumour is found to affect the margin of the lids without any accompanying inflammation or suppuration. This is named *grando*. It may be punctured with a lancet, its contents squeezed out and a pencil of nitrate of silver applied freely within the cavity. Another species of chronic tumour is named *chalazion*, from its resemblance to a hailstone; and there are some very small watery tumours observed, about the size of a millet-seed, which are therefore termed *milium* or *phlyctenula*.

A simple puncture, or a slight application of the nitrate of silver, is usually effectual in dispersing them.

*Encysted tumours* are generally found occupying the substance of the lid, usually between the tarsal cartilage and the fibres of the orbicularis muscle. They are found in either eye-lid, and very often in both. Sometimes these tumours are filled with a watery fluid, at others with a puriform matter, and sometimes they consist of fleshy or vascular growths. Occasionally, these tumours disappear by absorption, and this process may, in some instances, be accelerated by friction on the external surface of the lid. To aid this, we may prescribe some stimulating application, such as the soap or mercurial liniment. Instances of spontaneous absorption are not, indeed, uncommon.

Sometimes these tumours disappear and recur at irregular intervals; and I have known them to occur in females during pregnancy, and disappear after parturition. In like manner, any considerable change in the system such as fever, favours their absorption. Thus, a child who was brought to me with an encysted tumour of the lid, had, a few days afterwards, an attack of measles, on recovering from which the tumour had disappeared without any means having been employed. In general, however, this process cannot be relied upon, and the patient will prefer the removal of such a tumour at once.

*Operation.*—For this purpose we must use a scalpel or a pair of curved scissors, with which it must be cautiously dissected out. The first step is to evert the lid, for the operation should always be performed from the inner surface, then the tumour is to be transixed with a slender hook or a tenaculum, and an incision is made through the cartilage so as to expose it, when it will be readily excised either with the scalpel or scissors. Care must be taken not to cut through the entire substance of the lid, as instances have been known in which a button-hole perforation has remained permanently from this cause.

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## SECTION X.

## SYPHILITIC ULCERATION.

Among the secondary symptoms of syphilis, an ulceration of the eye-lids is occasionally noticed. In some instances, the conjunctival surface only is affected, but more commonly it is seen affecting the integuments. Syphilitic ulceration of the eye-lids shows the same characters as when the disease is witnessed in other parts of the system—generally a sloughy indolent aspect, frequently destroying the texture of the part. Similar treatment to that usually adopted for secondary syphilis is to be recommended, such as calomel and opium, or the blue pill, with sarsaparilla and iodine internally, and local stimulants, as the nitrate of silver or the red precipitate ointment externally.

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## SECTION XI.

## CARCINOMA OF THE EYE-LIDS.

Cancer of the eye most commonly commences in the palpebræ and extends to the globe. The lower lid is usually the seat of the affection. A small hard tubercle is first noticed on the surface, which gradually ulcerates and extends to the deeper-seated textures. Its progress is usually very slow. The only method of preventing its extension is by a complete excision of the morbid structure.

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## SECTION XII.

## ENCANTHIS.

The lachrymal caruncle is sometimes the subject of enlargement. It then projects between the margins of the lids and becomes a source of



irritation. It is commonly a result of inflammation attacking the textures seated about the inner canthus, and is occasionally induded by slight injuries. Is usually removable by a few touches of the nitrate of silver; if this prove insufficient, then the excision of the more prominent part with a pair of curved scissors must be resorted to.

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### SECTION XIII.

#### EPICANTHUS

Occasionally, from a redundancy of integument at the root of the nose, a fold of skin projects over and completely conceals the lachrymal caruncle; this is termed epicanthus. It is always congenital and affects both eyes. When it exists only in a trifling degree, it is unnecessary to interfere. If more considerable, it may be desirable to remove a portion of the integument. This is to be effected by excising an elliptical piece of skin from the root of the nose to the extent of about an inch. The quantity will be best decided by pinching up the integuments between the fingers, which will have the effect of removing the folds temporarily. When this quantity has been cut out, the same effect will be produced permanently. The edges of the wound should be kept in apposition by the hare-lip suture.

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### SECTION XIV.

#### NÆVUS OF THE EYE-LID.

Nævi materni are occasionally met with on the skin of the eye-lids or their immediate vicinity. There are several modes of effecting their removal. The simplest is that of vaccination. The surface of the tumour may be punctured, in two or three different places, with a lancet previously charged with vaccine lymph. The vaccine pustules proceed through their

usual stages, and after the crusts have fallen off, the morbid growth is usually destroyed. In some instances, perhaps, vaccination may fail : it will then be necessary to resort to either the tartar emetic ointment, caustic potash, the ligature, seton, or the excision of the diseased mass with the knife. All of these remedies are advocated by different surgeons. In the hands of the late Mr. Fawdington, the seton was a very effective remedy, but I have known it to fail. Dr. Marshall Hall has advised the tumour to be occasionally punctured with a cataract needle, so as to excite inflammation of its internal texture and prevent a cicatrix appearing on the skin. This plan is worthy of a trial, but I should fear it would hardly be successful except in very slight cases.

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## SECTION XV.

## ADHESIONS OF THE EYE-LIDS.

I have before referred to the subject of adhesion between the opposing surfaces of the conjunctiva, as arising from severe injuries and from inflammation. Sometimes adhesions of the eye-lids are observed to be congenital. I have seen more than one instance of this. Occasionally, the tarsal margins are adherent to each other. This condition is technically named *anchylo-blepharon*. When the eye-lids are adherent to the surface of the globe, then the affection is named *sym-blepharon*. In one case of this latter description, which I observed, and which was congenital, the eye-lids and globe appeared to be completely adherent throughout, except that there was a small aperture at the inner canthus, at which the tears were discharged. The whole had a sunken appearance, and was so soft and flaccid, that it was evident that the eye was either imperfectly developed, or had been the subject of adhesive inflammation anterior to birth, so that there was no encouragement to interfere.

*Congenital deficiency* of the palpebræ, or of some portion of them, is occasionally witnessed. That most commonly noticed is termed *coloboma palpebræ*, in which the lid is divided into two parts by a fissure similar to hare-lip, and admits only of the same treatment.

## SECTION XVI.

## INJURIES OF THE EYE-LIDS.

The palpebræ are very frequently injured by blows, which occasion a considerable amount of extravasation of blood (ecchymosis) in the cellular texture, giving an unpleasant appearance, which the patient is usually very anxious to get rid of. Its removal, when very considerable, may be facilitated by the application of leeches and evaporating lotions. A certain time, however, usually elapses before the complete evacuation of the extravasated blood is effected by absorption. In the meantime, if painting the skin of a flesh-colour is resorted to, as a means of concealing the mischief, during the period of absorption. When the eye-lids are lacerated by sharp instruments, great care must be taken to bring the edges carefully together. Usually, one or two sutures are used to retain them in apposition, which must be further protected by bandages or straps.

## CHAPTER XI.

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### DISEASES OF THE LACHRYMAL APPARATUS.

THE lachrymal passages are very frequently the seat of disease, this being generally indicated by one very prominent symptom, viz., an obstruction to the flow of tears, which therefore escape from the inner canthus over the cheek.

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#### SECTION I.

##### DACRYOCYSTITIS, OR INFLAMMATION OF THE LACHRYMAL SAC.

This is a very frequent source of the obstruction. It is indicated by the ordinary signs of inflammation, viz., redness, tenderness to the touch, and swelling of the integuments at the inner canthus, over the situation of the lachrymal sac. When the inflammation is very acute, the pain is often considerable, and extends to the eye and into the nasal duct. The treatment of this affection must, in the first instance, be strictly antiphlogistic, such as the application of leeches to the inflamed surface, evaporating lotions, and in the internal administration of purgatives. With proper attention, it occasionally happens that the inflammation totally subsides without being productive of any serious result.

*Suppuration of the Lachrymal Sac.*—There is, however, in most instances, a strong tendency to suppuration, a change which is readily observed and is indicated by the usual phenomena. When it is established, the cold lotions are to be changed for warm fomentations and poultices. The abscess should be speedily opened, when a considerable quantity of muco-purulent fluid is discharged, and the swelling subsides.



teguments remains, which communicates with the lacrym through which the tears and mucus are discharged, constituting *fistula lachrymalis*, a term which is by some indiscriminately applied to all cases in which there is an obstruction of passage. When this obstruction is permanent, it is probably most cases, to a constriction of the lining membrane of the duct analogous to what takes place in stricture of the urethra, with instances, there is doubtless some diseased condition of the duct, narrowing and sometimes obliterating the duct. In such cases a renewed attack of inflammation and suppuration of the duct comes on, and proves a source of considerable anxiety and distress. We have known instances in which the attack has come on almost at the period of menstruation, and afterwards subsided. In some cases the disease comes on slowly, without the existence of acute inflammation or suppuration, and then the enlargement of the sac is so gradual that the patient being able with the finger to evacuate the mucus through the superior or inferior aperture. Sometimes the bony canaliculus can be actually obliterated, and this may be either congenital or the result of disease.

*Treatment.*—The treatment of obstruction of the lacrym duct is to be directed to the removal of the cause, and to the relief of the symptoms.

style can be effected, it is necessary to make an incision through the integuments and into the lachrymal sac and orifice of the duct. This is best affected with a sharp-pointed bistoury, which should be introduced perpendicularly at the point where the lachrymal canals enter the sac, and over the tendon of the orbicularis, and pushed into the duct as far as it will pass. The style is then, in general, readily introduced; but when the obstruction is considerable, it is sometimes not easy of accomplishment. But the difficulty which is commonly experienced arises from the swelling and induration of the integuments, which are often so great as to render it no easy matter to ascertain the precise situation of the orifice of the duct. When the style has been properly introduced, there is not much occasion to disturb it frequently; but it may be occasionally removed for the purposes of ablution, and to ascertain if the passage continue to be much constricted or otherwise. It is commonly necessary to wear this instrument within the duct for several months, or even years; and although it is almost always of considerable benefit to the patient, yet it frequently fails to effect a cure, as after its withdrawal the tears are sometimes apt to flow over the cheek, but at the same time there is much less disposition to suppuration than before.

Considerable pain and irritation sometimes follow the operation, so that the palpebræ are much swollen, and incapable of being separated for several days; but all this usually subsides in a short time, and it will be proper to prescribe some evaporating lotion, or a bread-and-water poultice, with a view of diminishing the irritation. It occasionally happens, likewise, that the integuments over the sac are so much swollen that the style is buried within, and it is very difficult to withdraw it. This accident may be prevented by tying a piece of thread round the neck of the instrument at the time of its introduction.

Some surgeons prefer the use of a small *silver tube*; the great advantage of this instrument is, that it may be introduced entirely within the sac, the integuments being allowed to heal over it, so that nothing is seen externally; the contrary of which is a great objection in the minds of some persons to the use of the style. The tube was much recommended by Dupuytren, and it is frequently called after him, although it was introduced into practice by Joubert. It is probably not of much importance which instrument is used; I have frequently tried both with very good effect. In the case of the tube, after it has been worn a few months, it becomes

considerably corroded, and ultimately passes downwards into the nostril. Such at least has occurred in some cases which I have witnessed.

CASE.—Mrs. S., about 45 years of age, consulted me in July, 1838, complaining of considerable irritation in her right eye, tumefaction over the situation of the lachrymal sac, and a frequent flow of tears and mucus down the face. She had been annoyed in this manner for some months, the integuments over the sac becoming swollen, inflamed, suppurating, and then gradually subsiding. The disease returned periodically, and always about the time of menstruation. The simple antiphlogistic treatment was at first recommended, with temporary relief. The affection continuing, it was thought advisable to introduce the style into the nasal duct, which I did in the customary way without difficulty. This she wore for about six months, when she expressed a strong desire that something more should be done, as the tears continued to run over the cheek, so as to tease her considerably, although her sufferings had been materially relieved. To gratify her I consented to remove the style, and to insert instead of it one of the silver tubes. This was accomplished with great facility, so slight was the obstruction. On the next day the aperture had healed over, there was nothing visible externally, and she expressed herself comfortable. She continued to go on well, and soon ceased to complain. The tears now passed off through the duct, and she expressed herself highly delighted with the result of the treatment, considering herself as cured. After this I saw her occasionally, and she continued quite free from trouble more than two years, when she again began to complain of uneasiness in the corner of her eye, and said that, on blowing her nose, she thought she felt the movement of the tube. There was a slight degree of tenderness and watery state of the eye, and a capillary aperture was visible just over the sac, through which the lachrymal fluid appeared to ooze. Not perceiving that anything further could be done, I advised her to wait patiently any future change. A few months afterwards, she was startled one morning, while in bed, at experiencing a sudden sense of choking, as if from some foreign body in the throat, and which when ejected, proved to be the remains of the tube which had been introduced into the lachrymal sac *three years before*. More than one half of the tube had been corroded, the broad upper portion being entirely gone, or else separated from the lower, and remaining behind. She expressed herself easier after this, and had not much to complain of, except the discharge of the tears through the fistulous aperture in the sac, which, however, was not very distinct, and ultimately quite healed.

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## SECTION II.

## EPIPHORA.

There is a minor degree of obstruction of the lachrymal passages sometimes observed, which is also indicated by a watery state of the eye, the tears running over the cheek inordinately from very slight causes, more particularly exposure to cold,—a condition which is termed *epiphora*. In this case, there is probably some slight constriction of the lachrymal canals, or possibly of the nasal duct. It is distinguished from the preceding affection by the absence of distention of the lachrymal sac, and of the discharge of mucus on pressure. To remedy this inconvenience, it will be proper, in the first instance, to try the effect of some mild stimulant, dropped into the inner canthus; and if this be ineffectual, and the constriction should appear to be in the lachrymal canals, we may then introduce a very fine wire probe through the puncta into the sac. If the constriction should appear to be in the nasal duct, then probably the only remedy will be the style or tube, if the case should be deemed of sufficient importance to require such treatment. There is a small instrument, somewhat resembling a sound, which may also be properly introduced from the nostril into the duct, for the purpose of ascertaining whether there be constriction or otherwise.

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## SECTION III.

## DISEASES OF THE LACHRYMAL GLAND.

The lachrymal gland is very rarely affected with disease. In inflammatory affections of the orbit, as well as those of a fungoid and cancerous description, it will doubtless become involved: but it is very unusual to meet with any idiopathic affection of this organ. Inflammation of the lachrymal gland is described by some authors, but I have never witnessed such a case. It is indicated by an inflammatory swelling at the upper part of the orbit, accompanied by the ordinary symptoms of inflammation of the orbital textures, and occasionally terminates in suppuration; in some instances leaving a fistulous aperture, through which the tears are



discharged, constituting another variety of *fistula lachrymalis*. Strum enlargements of the lachrymal gland are also occasionally met with. Hydatid cysts have likewise been found in it. In the latter case, it so times happens that so much irritation and deformity are occasioned, as render its extirpation desirable.

# INDEX.

## A.

Abscess of the cornea, 115.  
Absence of the iris, 208.  
Absorption, spontaneous, of the crystalline lens, 305.  
Accidental cataract, 286.  
Adhesions of the eyelids, 393.  
———, conjunctiva, 97.  
———, operation for, 98.  
Affections of the eye, supplementary, 339.  
Albinism, 213.  
Amaurosis, active, 216.  
———, from affections of the fifth nerve, 230.  
———, chronic retinitis, 220.  
———, general debility, 231.  
———, sympathetic or functional, 226.  
———, symptomatic, 229.  
Amaurotic cat's-eye, 236.  
Anchylo-blepharon, 393.  
Animalculæ in the anterior chamber, 307.  
Anterior chamber, dropsy of, 307.  
———, congenital dropsy of, 54.  
———, animalculæ in, 307.  
Anomalous growths, 91.  
Aqueous humour, evacuation of, by operation, 46, 114.  
———, inflammation of membrane of, 111.  
Aquo-capsulitis, 111, 113.  
Arthritic ophthalmia, 151.  
Artificial eye, 317.  
——— lenses, 306.  
——— light, 344.  
——— pupil, operation for, 181.  
Asthenopia, 342.  
Atrophia oculi, 317.

## B.

Blepharitis idiopathica, 373.  
Blepharo-spasmus, 69.

## C.

Cancer oculi, 322.  
Capsular cataract, 243, 281.  
Capsule and aqueous humour, diseases of, 307.  
Capsulitis, 111, 242.

Capsulo-lenticular cataract, 243.  
Carcinoma of the eyelids, 391.  
Cataract, 242.  
———, accidental, 286.  
———, capsular, 243, 281.  
———, capsulo-lenticular, 243, 281.  
———, congenital, 298.  
———, depression of, 267.  
———, division of, 272.  
———, followed by extraction, 277.  
———, drilling of, 279.  
———, extraction of, 248, 254.  
———, extraction of, with the grooved needle-knife, after division, 278.  
———, extraction of, through the sclerotica, 267.  
———, extraction of, through a quarter section of the cornea, 280.  
———, hard, 244.  
———, lenticular, 243.  
———, reclinatio, of, 269.  
———, rising of, 271.  
———, selection of an operation for, 302.  
———, soft, 271.  
———, traumatic, 286.  
Catarrhal ophthalmia, 21.  
Cat's-eye, amaurotic, 236.  
Chalazion, 389.  
Choroid, diseases of, 209.  
———, inflammation of, 209.  
———, malformation of, 213.  
———, wounds of, 213.  
Choroiditis, 209.  
Chronic iritis, 172.  
———, ophthalmia, 13.  
Ciliary ligament, separation of the iris from, 206.  
Closed pupil, 181.  
Coloboma palpebræ, 393.  
Colour-blindness, 347.  
———, imperfect perception of, 347.  
Congenital cataract, 298.  
———, deficiency of the eye-lids, 393.  
———, dropsy of the anterior chamber, 54.  
———, ophthalmia, 54.  
———, imperfection of the crystalline lens, 298.  
Conical cornea, 135.  
———, operation for, 137.  
Conjunctiva, adhesions of, 97.

- Conjunctiva, operation for, 98.**  
 \_\_\_\_\_, of the cornea, removal of  
 foreign bodies from, 95.  
 \_\_\_\_\_, discolouration of, by ni-  
 trate of silver, 93.  
 \_\_\_\_\_, diseases of, 4.  
 \_\_\_\_\_, granular, 89.  
 \_\_\_\_\_, hæmorrhage from, 92.  
 \_\_\_\_\_, injuries of, 93.  
 \_\_\_\_\_, removal of foreign bodies  
 from, 94.  
 \_\_\_\_\_, ulceration of, 92.  
 \_\_\_\_\_, xeroma of, 91.  
 \_\_\_\_\_, wounds of, 100.  
**Conjunctivitis, 7.**  
 \_\_\_\_\_, mucosa, 21.  
 \_\_\_\_\_, puriformis, 25.  
 \_\_\_\_\_, pustulosa, 61.  
 \_\_\_\_\_, traumatic, 98.  
**Contagious ophthalmia, 25, 29.**  
**Contraction, preternatural, of the pupil,**  
 199.  
**Corectomia, 183.**  
**Cornea, abscess of, 115.**  
 \_\_\_\_\_, conical, 135.  
 \_\_\_\_\_, diseases of, 101.  
 \_\_\_\_\_, extraction of cataract through a  
 quarter section of, 280.  
 \_\_\_\_\_, fistula of, 117.  
 \_\_\_\_\_, inflammation of, 102.  
 \_\_\_\_\_, injuries of, 144.  
 \_\_\_\_\_, malformations of, 142  
 \_\_\_\_\_, opacity of, 121.  
 \_\_\_\_\_, sloughing of, 120.  
 \_\_\_\_\_, staphylocoma of, 126.  
 \_\_\_\_\_, ulceration of, 116.  
 \_\_\_\_\_, vascular zone around, 103.  
**Corneitis, 102.**  
 \_\_\_\_\_, chronic, inoculation with the  
 matter of purulent ophthalmia in, 110.  
 \_\_\_\_\_, strumous, 107.  
**Corodialysis, 188.**  
**Corotomia, 186.**  
**Couching, 267.**  
**Crystalline lens, congenital imperfection**  
 of, 298.  
 \_\_\_\_\_, reproduction of, 305.  
 \_\_\_\_\_, spontaneous absorption of,  
 305.  
**Cysticercus cellulose, 307.**
- D.**
- Dacryocystitis, 395.**  
**Debility, general, amaurosis from, 231.**  
**Deficiency, congenital, of the eyelids,**  
 393.  
**Depression of cataract, 267.**  
**Diathesis, strumous, 67.**  
**Dilatation of the pupil, preternatural,**  
 201.  
**Discolouration of the conjunctiva, by**  
 the argenti nitras, 93.  
**Diseases of the aqueous humour and**  
 capsule, 307.  
 \_\_\_\_\_, choroid, 209.  
 \_\_\_\_\_, conjunctiva, 4.  
 \_\_\_\_\_, cornea, 101.  
 \_\_\_\_\_, crystalline humour, 242.
- Diseases of the eye-lids, 373.**  
 \_\_\_\_\_, globe, 308.  
 \_\_\_\_\_, humours, 242.  
 \_\_\_\_\_, iris, 162.  
 \_\_\_\_\_, lachrymal apparatus,  
 395.  
 \_\_\_\_\_, lachrymal gland, 399.  
 \_\_\_\_\_, retina, 215.  
 \_\_\_\_\_, sclerotics, 147.  
 \_\_\_\_\_, vitreous body, 306.  
**Dislocation of the lens, 295.**  
**Division of the iris, 186.**  
 \_\_\_\_\_, soft cataract, 272.  
 \_\_\_\_\_, soft cataract, followed by ex-  
 traction, 277.  
 \_\_\_\_\_, and extraction with grooved  
 needle-knife, 278.  
**Drilling a cataract, 279.**  
**Dropsy of the anterior chamber, 307.**  
 \_\_\_\_\_, congenital, of the anterior cham-  
 ber, 54.  
 \_\_\_\_\_, of the eye-ball, 312.
- E.**
- Ecchymosis, 100.**  
**Ectropion, 378.**  
**Egyptian ophthalmia, 25, 29.**  
**Encanthis, 391.**  
**Entropion, 380.**  
**Epicanthus, 392.**  
**Epiphora, 399.**  
**Erysipelatous inflammation of the eye-**  
 lids, 374.  
 \_\_\_\_\_, ophthalmia, 65.  
**Evacuation of the aqueous humour by**  
 operation, 45, 114.  
**Examination of diseased eye, 4.**  
**Exanthematous ophthalmia, 69.**  
**Excision of the tarsal margin in entro-**  
 pion, 382.  
**Excrescences, fungous, 90.**  
**Exophthalmia, 314.**  
**Extirpation of the eye, 323.**  
**Extraction of cataract, 248, 254.**  
 \_\_\_\_\_, with grooved  
 needle-knife, after division, 278.  
 \_\_\_\_\_, through quar-  
 ter section of the cornea, 280.  
 \_\_\_\_\_, through the scler-  
 otica, 267.  
 \_\_\_\_\_, of soft cataract, after divi-  
 sion, 277.  
**Eye, artificial, 317.**  
 \_\_\_\_\_, diseased, examination of, 4.  
 \_\_\_\_\_, extirpation of, 323.  
 \_\_\_\_\_, supplementary affections of, 339.  
**Eye-ball, dropsy of, 312.**  
 \_\_\_\_\_, paralysis of the muscles of, 366.  
 \_\_\_\_\_, wounds and injuries of, 325.  
**Eyelid, nævus of, 392.**  
 \_\_\_\_\_, upper, operation on tarsus of, in  
 entropion, 381.  
**Eyelids, adhesions of, 393.**  
 \_\_\_\_\_, carcinoma of, 391.  
 \_\_\_\_\_, congenital deficiency of, 393.  
 \_\_\_\_\_, diseases of, 373.  
 \_\_\_\_\_, encysted tumours of, 390.

Eyelids, erysipelatous inflammation of, 371.  
 ———, injuries of, 394.  
 ———, phlegmonous inflammation of, 373.  
 ———, syphilitic ulceration of, 391.  
 ———, tumours of, 389.

## F.

Far-sight, 355.  
 Fifth nerve, amaurosis from affection of, 230.  
 Filaria in the anterior chamber, 307.  
 Fistula of the cornea, 117.  
 ——— lachrymalis, 396.  
 Foreign bodies, removal of, from the conjunctiva, 94.  
 ———, ———, from the conjunctiva of the cornea, 95.  
 Functional amaurosis, 226.  
 Fungous excrescences, 90.  
 Fungus hæmatodea, 318.  
 ———, simple, 317.

## G.

Gland, lachrymal, diseases of, 399.  
 Glaucoma, 237.  
 Globe, diseases of, 308.  
 ———, malformations of, 337.  
 ———, suppurative of, 311.  
 Gonorrhœal ophthalmia, 46.  
 ——— scleritidis, 151.  
 Grando, 389.  
 Granular conjunctiva, 89.  
 Growths, anomalous, 91.  
 ———, morbid, from the iris, 204.

## H.

Hard cataract, 244.  
 Hemipopia, 233.  
 Hemeralopia, 339.  
 Hæmophthalmia, 315.  
 Hæmorrhage from the conjunctiva, 92.  
 ——— eyeball, 315.  
 Hordeolum, 389.  
 Humour, aqueous, diseases of, 307.  
 ———, crystalline, disease of, 242.  
 Humours, diseases of, 242.  
 Hydrophthalmia, 312.

## I.

Imperfect perception of colour, 347.  
 Infants, iritis in, 177  
 Inflammation of the choroid, 209.  
 ——— conjunctiva, 7.  
 ——— cornea, 102.  
 ——— iris, 162.  
 ——— lachrymal sac, 395.  
 ——— retina, 216.  
 ——— sclerotica, 147.  
 Injuries of the conjunctiva, 93.  
 ——— cornea, 144.  
 ——— eyeball, 325.  
 ——— eyelids, 394.

Injuries of the retina, 240.  
 ——— sclerotica, 161.  
 Inoculation of the matter of purulent ophthalmia in chronic corneitis, 110.  
 Introduction, 1.  
 Iridenceleisis, 188.  
 Iris, absence of, 208.  
 ———, diseases of, 162.  
 ———, division of, 186.  
 ———, excision of a portion of, 183.  
 ———, inflammation of, 162.  
 ———, malformations of, 207.  
 ———, morbid growths from, 204.  
 ———, prolapsus of, 119.  
 ———, separation of, from the ciliary ligament, 206.  
 ———, staphyloma of, 127.  
 ———, tremulous, 203.  
 ———, varieties of colour in, 203.  
 ———, wounds of, 206.  
 Iritis, 162.  
 ———, chronic, 172.  
 ———, in infants, 177.  
 ———, syphilitic, 175

## K.

Keratitis, 102.  
 Keratonyxis, 274.

## L.

Lachrymal apparatus, diseases of, 395.  
 ——— gland, diseases of, 399.  
 ——— sac, inflammation of, 395.  
 Lagophthalmos, 385.  
 Lens, congenital imperfection of, 298.  
 ———, dislocation of, 295.  
 Lenses, artificial, 306.  
 Lenticular cataract, 243.  
 Lentitis, 242.  
 Lids, erysipelatous inflammation of, 374.  
 ———, tumours of, 389.  
 Light, artificial, 344.  
 Lippitudo, 377.

## M.

Malformation of the choroid, 213.  
 Malformations of the cornea, 142.  
 ——— globe, 337.  
 ——— iris, 207.  
 Measles, ophthalmia from, 81.  
 Melanosis oculi, 320.  
 Membrane of the aqueous humour, inflammation of, 111.  
 Milla, 389.  
 Morbid growths from the iris, 204.  
 Motor oculi, paralysis of, 366.  
 Musca volitantes, 238.  
 Muscles of the eyeball, paralysis of, 366.  
 Mydriasis, 201.  
 Myopia, 350.  
 Myosis, 199.  
 ———, from non-absorption of the pupillary membrane, 201.

## N.

- Near-sight, 350.  
 Nerve, fifth, amaurosis from affection of, 230.  
 \_\_\_\_\_, sixth, paralysis of, 370.  
 Nitrate of silver, discolouration of conjunctiva from, 93.  
 \_\_\_\_\_, ulceration from, 19.  
 Nævus of the eyelid, 392.  
 Nyctalopia, 341.

## O.

- Opacity of the cornea, 121.  
 Operation for adhesions of the conjunctiva, 98.  
 \_\_\_\_\_ artificial pupil, 181.  
 \_\_\_\_\_ conical cornea, 137.  
 \_\_\_\_\_ couching, 269.  
 \_\_\_\_\_ division of cataract, 273.  
 \_\_\_\_\_ drilling a cataract, 279.  
 \_\_\_\_\_ ectropion, 379.  
 \_\_\_\_\_ encysted tumours of the eyelids, 390.  
 \_\_\_\_\_ entropion, 380.  
 \_\_\_\_\_ evacuation of the aqueous humour, 45, 114.  
 \_\_\_\_\_ extirpation of the eyeball, 323.  
 \_\_\_\_\_ extraction of cataract, 248, 254.  
 \_\_\_\_\_ fistula lachrymalis, 396.  
 \_\_\_\_\_ pterygium, 87.  
 \_\_\_\_\_ removal of foreign bodies from the conjunctiva, 94.  
 \_\_\_\_\_ removal of foreign bodies from the conjunctiva of the cornea, 95.  
 \_\_\_\_\_ selection of, for cataract, 302.  
 \_\_\_\_\_ staphyloma, 130.  
 \_\_\_\_\_ staphyloma scleroticæ, 159.  
 \_\_\_\_\_ strabismus, 361.  
 Ophthalmia, catarrhal, 21.  
 \_\_\_\_\_, chronic, 13.  
 \_\_\_\_\_, congenital, 54.  
 \_\_\_\_\_, contagious, 25, 29.  
 \_\_\_\_\_, Egyptian, 25, 29.  
 \_\_\_\_\_, crupelatus, 63.  
 \_\_\_\_\_, exanthematous, 69.  
 \_\_\_\_\_, gonorrhœal, 46.  
 \_\_\_\_\_, internal, 308.  
 \_\_\_\_\_, morbillosa, 81.  
 \_\_\_\_\_, neonatorum, 53.  
 \_\_\_\_\_, porriginous, 69.  
 \_\_\_\_\_, purulent, 25.  
 \_\_\_\_\_, purulent, in the adult, 26.  
 \_\_\_\_\_, \_\_\_\_\_ results of, 44.  
 \_\_\_\_\_, purulent, in the infant, 53.  
 \_\_\_\_\_, purulent, inoculation of the matter of, in chronic corneitis, 110.  
 \_\_\_\_\_, pustular, 61.  
 \_\_\_\_\_, scarlatinosa, 81.  
 \_\_\_\_\_, simple, 7.  
 \_\_\_\_\_, strumous, 66.  
 \_\_\_\_\_, sympathetic, 329.  
 \_\_\_\_\_, tarsi, 376.

- Ophthalmia, varicose, 316.  
 \_\_\_\_\_ variolosa, or from small-pox, 77.  
 \_\_\_\_\_ variolosa, secondary, 81.  
 Ophthalmitis, 308.  
 Ossification of the retina, 241.

## P.

- Palpebræ, phlegmonous inflammation of, 373.  
 Paralysis of the motor oculi, 366.  
 \_\_\_\_\_ muscles of the eyeball, 366.  
 \_\_\_\_\_ sixth nerve, 370.  
 Perception, imperfect, of colour, 347.  
 Phlegmonous inflammation of the palpebræ, 373.  
 Phlyctenna, 389.  
 Pinguecula, 88.  
 Porriginous ophthalmia, 69.  
 Presbyopia, 355.  
 Prolapsus iridis, 119.  
 Proptosis, 314.  
 Psorophthalmia, 376.  
 Pterygium, 82.  
 \_\_\_\_\_, crassum, 82.  
 \_\_\_\_\_, operation for, 87.  
 \_\_\_\_\_, pingue, 88.  
 \_\_\_\_\_, tenue, 82.  
 Ptoxis, 388.  
 Pupil, artificial, operation for, 181.  
 \_\_\_\_\_, closed, 181.  
 \_\_\_\_\_, preternatural contraction of, 199.  
 \_\_\_\_\_, preternatural dilatation of, 201.  
 Purulent ophthalmia, 25.  
 \_\_\_\_\_, in the adult, 26.  
 \_\_\_\_\_, in the adult, results of, 44.  
 \_\_\_\_\_, of infants, 53.  
 \_\_\_\_\_, inoculation of the matter of, in chronic corneitis, 110.  
 Pustular ophthalmia, 61.

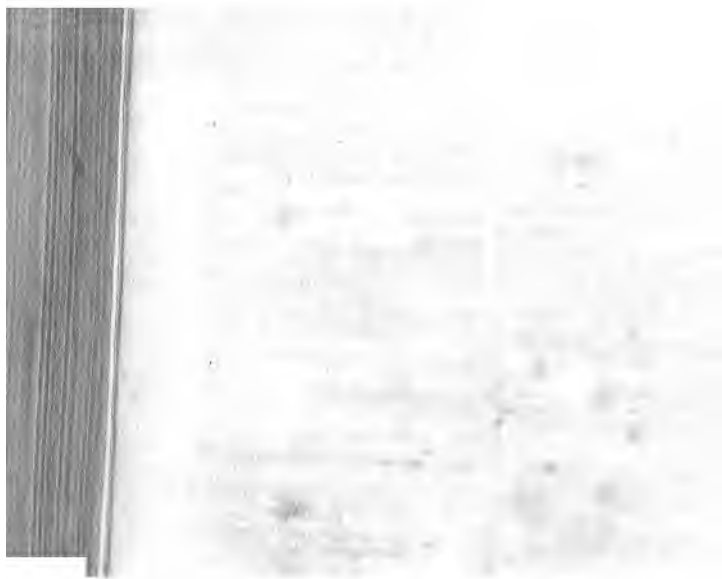
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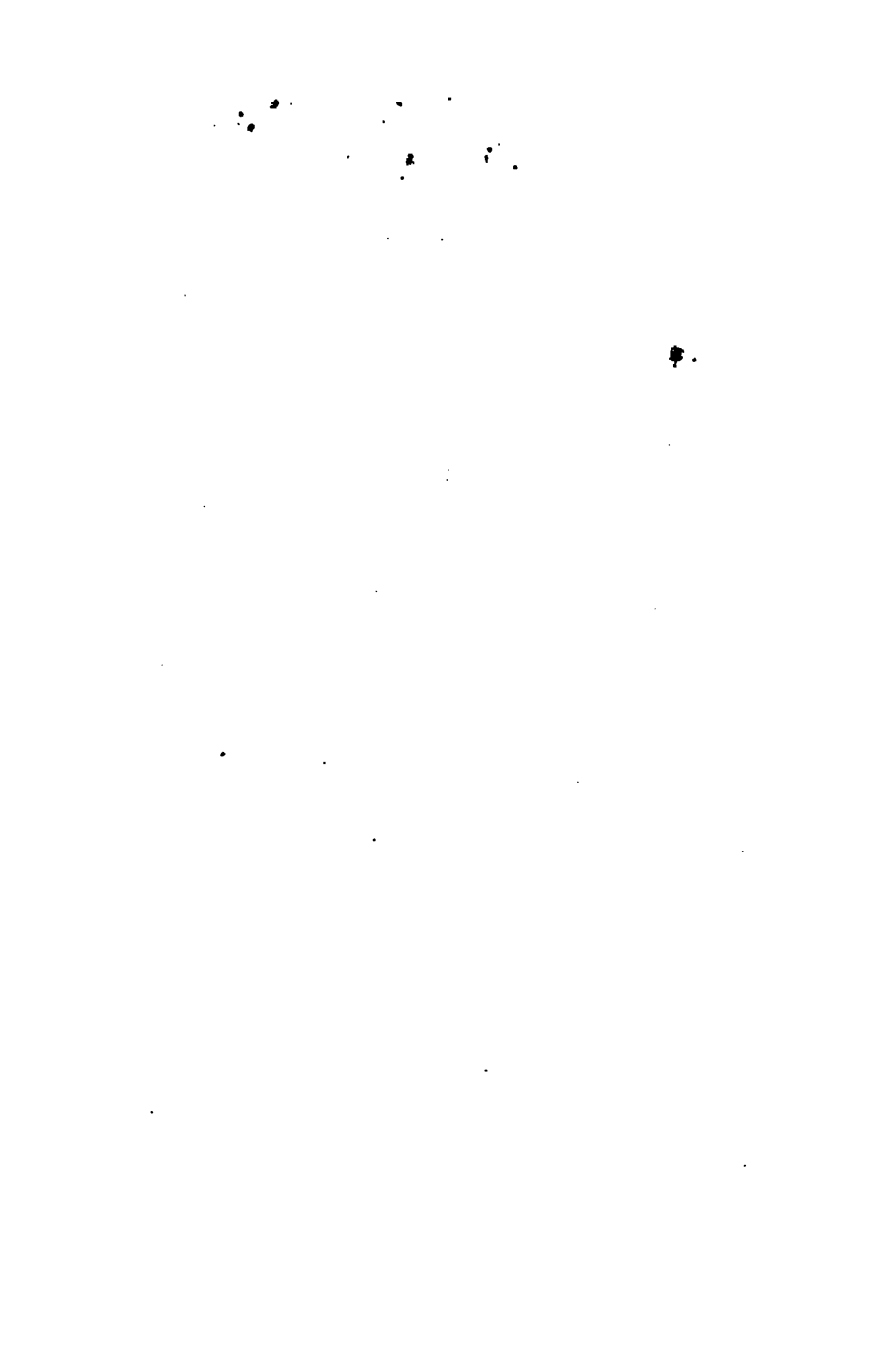
- Reclination of cataract, 269.  
 Removal of foreign bodies from the conjunctiva, 94.  
 \_\_\_\_\_ foreign bodies from the conjunctiva of the cornea, 95.  
 Reproduction of the crystalline lens, 305.  
 Results of purulent ophthalmia in the adult, 44.  
 Retina, diseases of, 215.  
 \_\_\_\_\_, inflammation of, 216.  
 \_\_\_\_\_, injuries of, 240.  
 \_\_\_\_\_, ossification of, 241.  
 Retinitis, 216.  
 \_\_\_\_\_, chronic, amaurosis from, 220.  
 Rheumatic sclerotitis, 151.

## S.

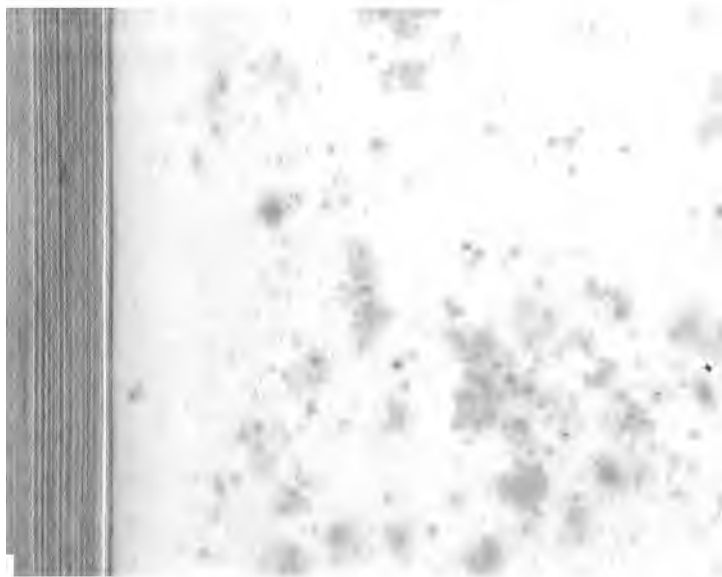
- Scarlatina, ophthalmia from, 81.  
 Sclerectomia, 159.  
 Scleroticæ, diseases of, 147.  
 \_\_\_\_\_, extraction of cataract through, 267.

- Sclerotica, inflammation of, 147.**  
 ———, injuries of, 161.  
 ———, staphyloma of, 157.  
**Sclerottitis, 147.**  
 ———, arthritic, 151.  
 ———, gonorrhoeal, 151.  
 ———, rheumatic, 151.  
**Secondary variolous ophthalmia, 81.**  
**Selection of an operation for cataract, 302.**  
**Separation of the iris from the ciliary ligament, 206.**  
**Sight, weakness of, 342.**  
**Simple fungus, 317.**  
**Sixth nerve, paralysis of, 370.**  
**Sloughing of the cornea, 120.**  
**Small-pox, ophthalmia from, 77.**  
**Soft cataract, 271.**  
**Spontaneous absorption of the crystalline lens, 305.**  
**Squint, 357.**  
 ———, operation for, 361.  
**Staphyloma corneæ, 126.**  
 ———, iridis, 127.  
 ———, operation for, 130.  
 ———, pellucidum conicum, 135.  
 ———, racemosum, 127.  
 ———, scleroticæ, 157.  
 ———, operation for, 159.  
**Strabismus, 357.**  
 ———, operation, 361.  
**Strumous corneitis, 107.**  
 ———, diathesis, 67.  
 ———, ophthalmia, 66.  
**Stye, 389.**  
**Supplementary affections of the eye, 339.**  
**Suppuration of the globe, 311.**  
**Symblepharon, 393.**  
**Sympathetic amaurosis, 226.**  
 ———, ophthalmia, 329.  
**Symptomatic amaurosis, 229.**  
**Synchysis oculi, 306.**  
**Syphilitic iritis, 175.**  
 ———, ulceration of the eyelids, 391.
- T.**
- Tarsal margin, excision of, in entropion, 382.**  
**Tarsus of the upper eyelid, operation on, in entropion, 381.**  
**Tinea tarsi, 377.**  
**Traumatic cataract, 286.**  
 ———, conjunctivitis, 98.  
**Tremulous Iris, 203.**  
**Trichiasis, 384.**  
**Tumours of the eyelids, 389.**
- U.**
- Ulceration of the conjunctiva, 92.**  
 ———, cornea, 116.  
 ———, from nitrate of silver, 19.  
 ———, syphilitic, of eyelids, 391.
- V.**
- Varicose ophthalmia, 316.**  
**Varieties of colour in the iris, 203.**  
**Variolous ophthalmia, 77.**  
 ———, secondary, 81.  
**Vascular zone around the cornea, 103.**  
**Vitreous body, diseases of, 306.**
- W.**
- Warts, 91.**  
**Weakness of sight, 342.**  
**Wounds of the choroid, 213.**  
 ———, conjunctiva, 100.  
 ———, cornea, 144.  
 ———, eyeball, 325.  
 ———, iris, 206.
- X.**
- Xeroma conjunctivæ, 91.**
- Z.**
- Zone, vascular, around the cornea, 103.**









10.



