

ILLUSTRATIONS
OF
THE USE
OF THE
OPHTHALMOSCOPE.

BY
WILLIAM MARTIN, F.R.C.S.,
LATE PROFESSOR OF OPHTHALMIC SURGERY,
CALCUTTA MEDICAL COLLEGE.

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ILLUSTRATIONS OF THE USE OF THE OPHTHALMOSCOPE.

IT has for some time seemed to me desirable to collect together some of the most precise data that we have as yet been able to find recorded regarding the actual appearances, under the ophthalmoscope, of the characters distinctive of the various ophthalmic affections, the results of which are recognisable by the aid of this instrument. Notwithstanding the appearance from time to time of various valuable works on the subject, some of them elegantly illustrated, such as Jäger's Plates, with the annexed descriptions, etc.; others with elaborate descriptions of morbid appearances, as the last edition of Desmarres' *Treatise on Diseases of the Eye*, etc.—the student will have felt, as I have myself, the great difficulty of making an accurate diagnosis of the efficient causes of the loss of sight, and concomitant ophthalmic affections, by the method of examination with the ophthalmoscope. No doubt very great exercise with this instrument is required before its proper use can be mastered. It is probably as difficult, if not more so, to attain an accurate insight into the information that may be gained by its use, as regards internal diseases of the

eye, as it is for the neophyte to attain an accurate knowledge of diagnosis of diseases of the chest by the aid of the stethoscope. In addition, we must remark that the knowledge of its use may be said to be, if not in its infancy, in a state far removed from what we may hope will be the case when we have had time and opportunity for greater experience. It is still difficult to attain an accurate diagnosis of the several diseases of the posterior parts of the eye; to define accurately choroiditis, retinitis, etc.; to determine the actual causes of the innumerable conditions which we must still be content to call amaurosis, amblyopia, glaucoma, etc.

We may hope to be able to enlarge our knowledge by the opportunities now offered to all engaged in the study of ophthalmic surgery at the various special eye hospitals. Having enjoyed the benefits of the ophthalmoscopical department, as well as of the splendid collection of drawings and museum now in progress of formation at the London Ophthalmic Hospital at Moorfields, I have thought that a collection of some of the facts positively known on the subject might be useful in supplying a want that I have experienced in my own case in the study of the ophthalmoscope. The great desideratum at present is the accumulation of real facts; that is, the exact appearances indicative of the diseases of the several component parts of the eye. In the course of time, with the aid of a more exact knowledge of the minute anatomy, physiology, and pathology of the eye, such as we may hope to attain, but by no means so likely as by the collections now forming at the Moorfields Hospital and elsewhere, the facts which have been

elicited by the observation and comparison of numerous inquirers will receive their due value; and we may expect as much success in the diagnosis and treatment of diseases of the eye by the use of the ophthalmoscope, as has been attained, since the time of Laennec, in the diagnosis and treatment of diseases of the chest by the use of the stethoscope, in combination with increased knowledge of general physiology and pathology.

In addition to the works of Desmarres and Jäger, above mentioned, the student and practitioner in ophthalmic surgery, who may not have varied opportunities of extending and comparing his acquisitions on this subject, as well as the kindred one of the anatomy and physiology of the eye, will find much useful information in Mr. Hogg's little work on the *Ophthalmoscope*, and in the several numbers of the *London Ophthalmic Hospital Reports*, which contain ophthalmoscopical illustrations, the researches of Hulke, Bader, etc. But, above all, his acquisitions would be increased by some time spent in the ophthalmoscopical department of that hospital, and in examining the collection of drawings and the museum now being formed, principally by the zeal and industry of the medical officers of that institution, and under charge of Dr. Bader, the curator, whose valuable services in improving our knowledge of this branch of science are bearing fruits in the admirable catalogue now in course of preparation, and cannot be too highly appreciated.

CRYSTALLINE LENS.

The information we are enabled to get with regard

to diseases of the eye by the aid of the ophthalmoscope is not by any means confined to the fundus of the globe. We can ascertain the state, morbid or healthy, of all the parts which lie posteriorly to the cornea; and its use is particularly applicable with reference to the state of the crystalline lens and its capsule, and especially to the degree of transparency of these parts. Thus we are able to distinguish true from spurious *cataract* in any spots which there may be on the capsule, etc. Appearances, which on an ordinary examination we should be inclined to attribute to cataract, are often proved by a careful ophthalmoscopical examination to be due to disease, probably irremediable, of the posterior tunics of the eye. As regards cataract, we detect, in cases in which the disease has advanced to the slightest degree of impairment of vision, a certain amount of obscuration or interruption of the quantity of light which would otherwise pass to the fundus of the eye. The obscuration may be partial or entire, according to the amount of opacity. We also find, even in incipient cases, particularly near the margin, opaque striæ, and occasionally over the surface, spots: in more advanced cases, the appearance of opaque septa, showing fibrous alterations of the lens; and between these opaque striæ or septa, are generally seen pretty transparent intervals. We find also frequently, after synechia posterior, patches of pigment which have become detached from the uvea, lying upon the anterior surface of the capsule; so that by this means we are enabled to detect with certainty alterations constituting cataract, which would not be always ascertainable by means of a magnifying lens, or by

the catoptric test. We also detect in the lens the presence of *cholesterine*, and the different *foreign bodies* which it may contain, as animalcules, etc.; the peculiar change of the lens which corresponds with the arcus senilis of the cornea (Desmarres); also any form of *dislocation of the lens*, entire or partial; and it is not necessary that there should be any loss of transparency in the part in order that we may detect it.

VITREOUS HUMOUR.

In inflammation of this part, which almost always accompanies that of the deep seated tissues of the eye, we find a general obscurity of the part, and often a quantity of flocculent shreds, whitish, often in constant movement. In this state the natural bright pink colour of the fundus is not reflected, but gives place to a dull yellowish-white appearance, and the optic papilla* and macula lutea are more or less obscured. Then we may have purulent and other deposits. In *synchysis* of the vitreous body, we find the flocculent shreds move very rapidly to the lowest place.

In the changes of the humour which accompany a *syphilitic condition* we constantly find flocculi—in reality white, but from the blaze of light present during the examination, appearing black—constantly moving in all directions with the movements of the head. Others have a white or grey appearance.

* Optic nerve entrance would probably be a more correct designation, as there is in reality no prominence at this part; but as the term optic papilla has been generally accepted, I shall continue to use it in this memoir, for the sake of convenience.

These are to be seen also as a result of iritis and other internal inflammations. They are not generally to be seen by the patients themselves.

There is also a condition of the vitreous humour which is described by Desmarres as *jumenteux*. He states that it is often present in inflammation of the deeper textures. There is a general turbidity, with numerous dark points in motion.

It is to be remarked that the impossibility of lighting up the fundus in cases where the lens and capsule are clear is not always to be attributed to disease of the vitreous body. There may be disease of the hyaloid membrane, or there may be infiltration from extravasated blood, or from what has been described as flakes of exudation. Sometimes, without any very apparent cause, as of the states of disorganisation before alluded to, all the light seems to become absorbed, so that there is no reflection of light whatever from the fundus.

Extravasations of blood, when found in the vitreous humour, may be from the retina or choroid. We generally see the clot low down, behind the lens, and it may be of a bright red colour. If it be from a retinal vessel we may be able to trace its origin by finding a black spot on the track of one of the vessels at the fundus, after time enough has elapsed for some clearing to take place; but if from a choroid vessel, we find deep seated ecchymosis, without a spot on a retinal vessel.

Various *floating bodies* are observable throughout the vitreous humour. These may have a motion corresponding with the ordinary movements of the eye; that is, as the patient moves his eye upwards

they will be seen to move downwards, and *vice versâ*; or they may move in the same direction as the globe. This would depend upon the comparative densities of the bodies and the vitreous body; if lighter than the vitreous, they will be carried along with it. This is the case with the floating particles which we so often see in disease arising from a syphilitic condition. The more dense bodies, as some forms of muscæ volitantes, etc., etc., are seen, after motion, to sink to the bottom of the humour. These may or may not be perceptible to the patient.

We may also find the various kinds of *parasitic animalcules* (cysticercus, etc.); and it would appear that none of the internal parts of the globe are free from being infested with these objects. They are found even in the retina.

We may also find many *foreign bodies*, pieces of iron, stone, which may be projected to that extent. These may become fixed to the sides or may float through the substance of the humour. In either case we shall find them often surrounded by a membraniform exudation.

Cases exemplifying all these are related by Anagnostakis, Ruete, Gräfe, and other authors.

CHOROID.

Congestion of the Choroid may be diagnosed by a hyperæmic state of the chorio-capillary layer. Choroidal inflammation, in various degrees, may then be expected to ensue, and to cause atrophy, maceration of the pigment, layers of exudation, etc. These again, would, in the end, bring on disorganisation of the retina.

In the first instance, we may find an unusually pale condition of the fundus. It does not light up well, and the appearance is rather of a pale orange yellow than the natural bright pink colour. We shall be likely, also, to find some discoloration of the fundus; instead of a uniform field, we see pigmental patches in parts. If these appearances last long the disease progresses to disorganisation. The effects on vision will be more evident according as this disorganisation—whether it be maceration of the pigment, or anything else—affects the macula lutea, or its immediate vicinity. The yellowish tint of the fundus becomes of a paler hue. We see the choroidal vessels through the retina, which before only formed part of a uniform red field. After a time we cannot distinguish the vessels.

We may see patches, of a rounded form, arising from the discoloration of the choroid, and want of pigment; at the same time the retinal vessels covering these become more tortuous, and probably varicose.

This state, which is called *maceration of the pigment*, there are strong grounds for thinking invariably leads to atrophy of the choroid and retina. According to Desmarres, the patches arising from disorganisation the result of choroidal disease, may be distinguished from patches arising from exudation, by being of a rounded form; the exudation patches being almost always of an elongated, or oblong form. The pigment becomes collected into spots, which look dark, and have jagged edges. Between these pigmental spots are often portions, red from extravasated blood. We may have, at the same time, patches from disorganisation and the other form. (See *Cases of Subacute-Choroiditis*, in Desmarres, at pages 419, and 421.)

Choroidal congestion is generally serious according to the length of time it has lasted.

Hypercæmia, of an acute character, is a concomitant of most internal ophthalmic inflammations ; but is in many cases remediable, and goes off with the cessation of the primary disease. The exudation patches, which are by no means rare in choroidal affections, besides having an elongated form, like that of a fillet or band, present a colour more or less bluish, easily contrasted with the white rounded patches, indicating disorganisation, absorption of pigment, and obliteration of the vascular layer of the membrane.

Sclero-Choroiditis, which is often either a primary disease, or a concomitant of other internal affections, when it has become advanced is known by a peculiar appearance, situated in immediate contact with the optic papilla. We shall find this part surrounded, totally or partially, by a patch, which begins by being semilunar, apparently prominent, but in reality concave. This is often far from being regular in its outline ; it is jagged too at the borders ; and if the disorganisation has gone on to any extent, it is in turn partly surrounded by a black mark or border, arising from deficiency of the choroid, and accumulation of pigment in this part. As the disease proceeds, this white patch, or arch, extends, forming at length a complete circle, but of irregular breadth, round the papilla.

In bad cases, the papilla looks as if concealed in a large white patch, having the appearance of a double cone ; and if the disorganisation proceeds, we shall have the state called *posterior, or sclerotic staphyloma* ; when, in consequence of the total absence of the re-

tina and choroid tunics, we see only the sclerotic beyond; or we may see it through a transparent retina. This is shown by our observing the retinal vessels traversing this white patch.

The entire absence of pigment epithelium, and other elements of the choroid, as well as of the retina, which has been noted in these and similar cases, by Desmarres, and other writers, we must remark is not observable in all cases, for Jäger states that in twenty-three instances he found the choroid a continuous membrane. (See Hogg *On the Ophthalmoscope*, p. 80.)

Apoplexy of the Choroid. We often find by itself or in conjunction with the deep-seated inflammations, apoplectic or bloody effusions. These may be in the form of a red patch, which may evidently raise the retina; there may be several of these, of different size, scattered over the fundus, and they may traverse the retina and pass into the vitreous humour, where they may become diffused, or appear as distinct clots. These clots are capable of absorption, and the time occupied by this process varies much in different cases. Some are very rapidly absorbed. While undergoing this process, they lose their bright red appearance, and become more or less brown; but those which remain unabsorbed a long time, often retain their primitive vivid red colour and character. As in other local changes in the fundus, the impairment of vision altogether depends upon the situation of these deposits. If they involve the immediate vicinity of the macula lutea, vision will be very much affected; but considerable bloody deposits may exist in other parts, and be more or less permanent, without materially impairing vision. Intermixed with

these collections, we often see the white patches which indicate the disappearance of pigment. (See Desmarres, vol. iii, p. 437, in which a bloody patch is seen, having its original appearance, after ten months duration.)

Atrophy of the Choroid is a concomitant or consequence of many of the internal inflammations, and is always a grave symptom. The ophthalmoscopical appearances differ according to the particular portion of the membrane: if it affects the first layer, the fundus, instead of the usual rose colour, presents a pale orange yellow or brown tint, and perhaps we find brownish patches and streaks, giving the appearance of a scratched picture. (Desmarres.) Secondly, where the arterial layer (*chorio-capillary*) has become affected, we have obliteration of the capillary network, and we see the larger vessels beyond with unusual distinctness. Thirdly, where the venous layer has become involved, we find pigmental deficiencies and accumulations in such a manner, that the fundus has a spotted appearance, like that of a tiger's skin.

RETINA.

In cases of *congenital insensibility of the retina*, we find an anæmic state coexisting with a minute condition of the vessels. This is particularly observable in the circulation at the papilla. In certain cases, an *entire absence of blood-vessels* has been found; and this has been supposed to be congenital (Desmarres, vol. iii, p. 445). In many cases of amaurotic insensibility of the retina, we find a partial anæmic state; and the change is particularly observable in

the papilla, which is unusually contracted, and presents the appearance of a pearly whiteness, with vessels few and small, etc.

Atrophy of the Retina is known by similar appearances—the pearly white contracted state of the optic papilla, etc. ; a general pallor of the fundus ; want of circulation, etc. In such a state, we must expect to find many other signs of severe internal disease and disorganisation, patches of exudation, patches of denudation, etc.

Varicosity of the Retinal Vessels is troublesome as a complication of the severe choroidal and retinal affections. It is said also (Desmarres) to exist in those who suffer from hæmorrhoids or habitual cerebral congestion, without producing any appreciable impairment of vision.

Retinal Patches of Exudation may be either nearly transparent, in which case we see a blueish white tint, scarcely perceptible ; or in the form of thick patches, in which we find vessels of new formation, the original vessels being lost. The new vessels are said to be recognisable as being contrasted in direction with that of the normal vessels.

Hyperæmia of the Retina is frequently seen as a consequence of acute or chronic inflammation. It is recognised by the unusually brilliant colour of the fundus, and the want of the usual distinguishing clearness of the papilla, in consequence of its becoming masked by vascularity. It seems to be blended altogether, or in great part, with the rest of the fundus. Sometimes it is so red as to resemble pannus of the cornea, or it may present the appearance of fascicular redness, similar to what we see in pustular corneitis, etc.

Chronic Retinitis. We find a general obscurity of the fundus, arising either from exudation of some kind, or simply congestion, or possibly alteration, of the choroid tunic beyond. This obscurity is to be distinguished from that of the vitreous humour by its not being nearly so perceptible at a distance from the optic papilla (as in the direction of the ora serrata), and from its evident existence often also, but not invariably, behind the vitreous body. The obscurity arises from light being reflected in less quantity from the fundus. We often see also the borders of the papilla irregular and ill defined; the rest of the fundus is sometimes overlaid with regular stripes of a dull red colour. The vessels, instead of pursuing a regular course to and from the papilla, sometimes disappear, and then after an interval reappear. This is a phenomenon often seen in œdema of the retina also. The vessels, at the same time, are more developed than usual, and the minuter ramifications come into view. Under this head, Mr. Hogg relates a case at page 133—a case where there was excessive congestion of the fundus, so that the papilla could not be distinguished: the retina was raised by effusion. Also, at page 134, a case is related in which, with this obscurity of the papilla, floating bodies were discerned in the vitreous humour.

Acute Retinitis. In this, as we may expect to be the case, we find various signs of plastic exudation. The fundus is more or less obscure, and looks often as if covered by a bluish grey varnish. Along the course of the vessels on both sides, we may find small white tracts. With this obscurity we may expect to find

vision very defective ; and it is so, particularly if the exudation or vascular disturbance extends in the direction of the macula lutea ; otherwise the disturbance of sight seems in many cases to be hardly commensurate with the changes which have taken place. See an instance in Desmarres, vol. iii, p. 465, where, with a considerable patch of exudation (but which, however, does not extend to the vicinity of the macula lutea), the patient has very good sight. The exudation sometimes contains newly formed vessels ; more often the normal vessels disappear in certain spots under the patch, to reappear at the farther edge of it, and then to pursue their regular course.

Œdema of the Retina. We find true thickening round the optic papilla. The vessels present a convex appearance, and the papilla has an unnatural yellow tint, which renders it less brilliant than usual. This affection occurs as a consequence of choroidal and retinal congestions of a chronic nature, and is a frequent concomitant of syphilitic affections of the posterior tunics. It may disappear gradually, as the primary affection subsides. Desmarres describes the appearances of the œdema which exists in conjunction with syphilitic cachexia as being of a dirty rose-colour, the raised portion of the membrane encroaching upon the papilla, which is always hyperæmic. Mr. Hogg, at page 137 of his book, relates a case in which the papilla displayed a circular grey ring within the regular margin, with mottling of the fundus ; vessels large and irregular. The retina was found in an œdematous state. Also, at page 138, another case.

This *Mottling of the Fundus* is a very characteristic

appearance. There is a want of uniformity of the red field, which presents the appearance of a pale yellow membrane, covered over with dark blue streaks in very many places. It occurs pretty often, and seems to indicate great disturbance of the choriocapillary circulation, and possibly obliteration of many of the minute vessels, with a very irregular and deficient distribution of pigment. It is, therefore, a concomitant of many of the more serious posterior congestions or inflammations.

Fatty Degeneration of the Retina has been found in certain cases, but the characters to be discovered by the ophthalmoscope are unsatisfactory. It may be suspected where there is albuminous urine, if at the same time we find defective vision, and the fundus generally obscured, and partly covered with yellowish patches, apparently prominent. (See Desmarres; Hogg, p. 70, etc.)

Apoplexy of the Retina is found, but not necessarily as a concomitant of special diseases, both in the plethoric and anæmic subject; the local circulation being affected in one case with positive, in the other with relative plethora. We see the fundus, perhaps more highly coloured than usual, overspread in places with bloody clots of very various sizes. These may present the appearance of circles surrounded by other circles, and this is observable in cases of albuminuria: effusions at the central parts of the field have a radiated form. We may be able to see the point of rupture of the vessel, in the form of a dark red patch along its track; but generally we are obliged to wait until some absorption has taken place before we detect the exact point of rupture.

Sanguineous Effusions on the Retina are often observed in acute inflammations of the retina and choroid; also in many states of local and general debility, particularly in conjunction with albuminous nephritis, heart-diseases, amenorrhœa, and hæmorrhoids. In Desmarres, vol. iii, p. 474, is figured a case in which effusion of blood, with great impairment of vision, occurred from a sudden rush of blood to the head; absorption subsequently took place, and all morbid symptoms were removed.

Subretinal Dropsy and Serous Effusions on the Retina. A portion of the fundus we shall see covered over by a floating mass, of a bluish white colour, with vessels upon it or mixed up with it: this will retain its size and appearance a long time. Together with this we may see white folds, appearing as if stretched out from the optic papilla. This mass, with the liquid in it, is seen to be in a constant state of fluctuation, but rests more often at the lowest part of the fundus. Upon it are seen stretched the vivid red lines which are the retinal vessels; sometimes the mass, instead of floating freely, moving in all directions, and then, settling below, becomes fixed to a portion of the choroid. The neighbouring retinal surface having been raised into folds, these folds seem to be pasted together by the effusion. Sometimes bloody matter is mixed with the serous effusion. We may see so large a portion of the retina detached, that it presents the appearance of a funnel stretched from the ora serrata to the papilla. The most striking and characteristic appearance is the floating vessels in the posterior part of the eye. The symptoms are those of amaurosis.

Softening of the Retina. This affection has been described by Dr. Bader in the *Ophthalmic Hospital Journal* for January 1858. He gives some instances, such as—

1. In a case—W. F., aged 34—where there was little but perception of light, both optic papillæ too well defined, the surface of the papilla presented the appearance of blue-grey dots in a watery ground; and near its margin, on the fundus, were irregular white patches, dotted with pigment; many brown pigment-islands in the field.

2. In another case—E. G., aged 55—in whom there was also only perception of light, the papilla well defined, a portion of it blue-grey, the inner portion presented a dirty white, finely dotted appearance; vessels normal, but unusually curved over a narrow ring, white, which forms its margin.

3. In another case—J. W., aged 57—vision of one eye lost; with the other he can with difficulty manage to find his way about. Optic papilla too well defined, and its surface blue-white, dotted on a watery ground. On the side nearest the macula lutea is a bluish grey crescent. On the fundus there are many brownish pigment-islands. Appearances of the two eyes similar.

As the disease advances, Dr. Bader describes the grey-blue appearance more marked; the circulation becomes less; and the vessels seem more bent over the margin of the papilla. Arterial pulsation is often seen. We also often see pigment-islands—that is, the hexagonal pigment layers—instead of the uniform choroidal red. He remarks it as an extraordinary circumstance, that the retina, although in this,

as in many other affections, it is liable to become disintegrated, is still a transparent medium. This disease is one of the complications likely to result in acute glaucoma.

Detachment of the Retina. It has been above stated that, among other causes for this condition, may be enumerated subretinal serous effusions; and that it often presents the appearance of a funnel-shaped body, extending from the vicinity of the ora serrata to the optic papilla or other portion of the fundus. Mr. Hogg, at p. 72, relates a case of traumatic amaurosis, where, with signs of exudation, the retina was becoming detached round the papilla; and notices cases of Gräfe, in which the retina was affected by various exudations, and had become detached. At p. 128 he also relates a case of Sichel's, in which, with general œdema of the retina, there was a partial detachment of it. The papilla could not be distinguished. Fundus much congested. At p. 131 he also relates a case in which the most prominent symptom was hemiopia. In both regions of the macula lutea were dark spots and pigment accumulations; in the right eye was detached retina.

Crystals of Cholesterine have been found mixed up with exudations of various kinds, as a consequence of retinal disease.

Malignant Diseases of the Retina. In certain cases we find, in an early stage of the disease, a portion, if not all of the fundus, covered by a brilliant coloured prominence, convex in shape, with blood-vessels which have become fixed to the surface, and do not fluctuate as in the partial detachment which arises from subretinal serous effusion. Sometimes, how-

ever, both conditions exist in combination (Desmarres).

Abnormal Insertion of the Optic Papilla, without any special disease, is described ; but further observation is required on this point.

Anæmia of the Papilla is observed in all cases of atrophy arising from chronic retinal disorders, also as a functional and temporary change in many cases in which there is no organic alteration of the retina, but where the retinal circulation has become interrupted. It is known by the papilla being unusually distinct from the rest of the fundus, the want of blood making it look white ; and, besides, we see what vessels there are unusually small and colourless. It seems sometimes to be smaller and more convex than natural, and is often somewhat irregular at its edges ; at other times, it seems to be flattened out, and larger than usual. Around it the circulation sometimes has the appearance of being unusually active.

Hyperæmia of the Papilla—a state coexisting with many affections, acute or chronic, of the posterior tunics—is characterised, on the other hand, by a want of distinctness of the optic papilla ; it becoming as highly coloured as the rest of the fundus, and often so very vascular that, even in cases where the entire fundus is hyperæmic, it cannot be distinguished, particularly at its margin, from the rest. The chief guide we have in that case is the course of the enlarged vessels. At the same time, we may find, particularly on compression, pulsation of the vessels which are enlarged, isochronous with the pulse at the wrist.

Aneurism of the Papilla has been spoken of by some writers.

Spontaneous Pulsation of the Vessels of the Papilla is a sign of severe disease. It is particularly noticeable as a sign in glaucoma, and is not always easily detected. We must observe carefully, to find the movement in the arteries; and this can generally be ascertained to be isochronous with the pulse.

Varicosities of the Vessels of the Papilla are often to be observed, in conjunction with various choroidal and retinal disorders. It is of consequence, as it is, of course, apt to lead to organic derangement; but some observers assert that considerable varicosities may exist without apparent derangement of vision.

Softening of the Papilla is a bad sign, and generally indicates approaching atrophy. The papilla looks unusually large and flattened out, with portions of it puffed; its colour a dirty yellow; borders very irregular; and there is often found, in combination, infiltration of the retina, exudations, etc.

Apoplexy of the Papilla, said to be confined to that part in some instances in which the disorder is not one of the most severe.

Atrophy of the Papilla is a sign of serious disease. It presents an unusually brilliant white appearance, the colour of mother-of-pearl, and is generally small and arched in the middle; the vessels sometimes small, at others rather dilated, and possibly varicose, seeming to disappear at the edges, and then reappear at another place. In cases in which the diminution of size is combined with unnatural prominence, and seems to arise from compression of the optic nerve at its entrance into the eye, the name of mushroom

atrophy has been given. (See Desmarres, vol. iii, p. 515, fig. 66.) In other cases, we have a depression of the optic nerve at its entrance, or cupped atrophy (*A. en godet* of Desmarres), said to be due to retraction of the central fibres of the optic nerve. The essential disease, which must have given rise to this phenomenon, will have advanced to a considerable degree before it is observable.

Fibrinous Degeneration of the Papilla. Mr. Hogg, at p. 101, notices Gräfe's statement, that he has found a case in which the papilla appeared flattened out, with its vessels atrophied. On a *post mortem* examination, the papilla was found to consist of tendinous tissue, with here and there a few nerve-fibres interspersed.

The affections called *amaurosis* and *amblyopia* will be noted together. Although these are not accurate scientific terms, they do well enough, in the present state of our knowledge, to indicate the physical symptoms and the derangement of vision attendant upon a well known condition, involving local and constitutional changes, the causes of which are, in the very large majority of cases, not ascertainable. It is only now that, since the introduction of examination by the ophthalmoscope, we are beginning to discover the local conditions upon which the derangements depend. In time, we shall be able to know something of the efficient and proximate causes of these conditions. We may even at present classify, in most instances, amaurosis as being organic or incurable, or only functional or curable; as being caused by disease of the brain or of the optic nerve, retina, or choroid, principally; and this we do

chiefly by our observation of the state of the fundus, and of the condition of the optic papilla and its vicinity. If the disease, however, lie somewhere between the optic nerve and the brain, it will not be discoverable by the ophthalmoscope; and if we find changes in the optic nerve, we may not know whether this is the essential disease, or whether it may be only symptomatic of diseased brain. It may be observed, that where we find the papilla compressed and atrophied, we have one indication for concluding that the efficient cause of the disease is external to the globe. The great practical utility of this improved means of diagnosis is, that whereas formerly, in a very large number of cases of amaurosis, various heroic measures were resorted to, in the way both of depletion and stimulation, where we find a state of organic amaurosis, or have seen strong reason to suspect that such a state exists, we shall avoid any such heroic remedies. On the other hand, whereas in many cases of amaurosis, they were set down from the first as incurable, and treatment was considered absolutely useless, we shall now find a certain proportion in which we have every reason to conclude that the cause is of a functional or curable nature, and that appropriate treatment, sometimes of an active character, in the way of depletion or stimulation, will be likely to be attended with the best results.

Amaurosis in connexion with Albuminuria. We shall see portions of the retina, generally near the papilla, covered with small patches of a vivid red colour; and in these, again, small white spots, as in retinal apoplexies. These spots enlarge as the red patch

diminishes, and seem to be due to absorption of pigment at the same time with that of effused blood; and concurrently we may have signs of œdema with infiltration of the papilla, white tracts in the course of the retinal vessels; and this may end in fatty transformation of the retina. Vision will become deteriorated according as the macula lutea becomes encroached upon, and will be gradually lost altogether. Desmarres figures a case in vol. iii, p. 520. Hogg, at p. 70, notices some observations of Quadri, who found, in some cases, the retina almost entirely detached, with œdema; in other cases, great hyperæmia, sanguineous effusion, fatty deposits, etc.

Amaurosis with Glycosuria or Diabetes Mellitus.

Observers have found the fundus of a pale grey colour; turbid vitreous humour; patches, the result of old ecchymoses which have become absorbed; patches of accumulated pigment; maceration of pigment. Cases are figured at pages 524 and 526, Desmarres, vol. iii.

Amaurosis with Syphilis. Two things are generally observable in eye diseases, where the constitution has become affected by a syphilitic taint. First, there are flocculi floating in the vitreous humour; secondly, a disorganised state of the retinal circulation. One or the other, or both these, in combination with other morbid changes, were observed in the following cases:—In a case of Mr. Poland's, May 31st, 1858 (see Bader, in *Ophthalmic Hospital Reports*, October 1858), there was primary syphilis. The right eye was affected with frequent inflammation; the left suddenly failed lately; there was no pain or inflammation. The fundus in both was

lighted up naturally. The retina was hazy; there were no flocculi in the vitreous body. The papilla was ill defined, surrounded by a yellow halo; its surface was grey, with a greyish white centre. The vessels were irregularly dilated; at certain parts of the fundus, in the left eye, chiefly at and near the macula lutea, were brilliant yellow white and brown patches. Dr. Bader remarks, that the brilliant cherry red œdematous appearance of the fundus, with well defined optic papilla, are often met with in syphilitic persons, particularly if they have taken much mercury or quinine. Vision in this case was very bad. In a case of Mr. Wordsworth's, January 27th, 1857 (see Plates 4 and 5, *Ophthalmic Hospital Reports*, October 1858)—inflammation had existed in both eyes—the right had recovered. In the left there was, during the intervals between the attacks, only perception of shadows. The general appearances were those of hereditary syphilis. In both, the papillæ were unusually distinct; they could be seen without the convex lens. The right one was normal, but was surrounded by a brilliant white patch, well defined by a line of pigment between it and the choroidal red: in the left, the same patches appeared; the vessels were tortuous. Further from the papilla were many small patches, some with a dot in the centre. The macula lutea was normal in both eyes. It is remarked, that the patches round the papilla in the left eye were not enough to account for the bad sight. It is probable that some change has taken place in the optic nerve; and it is unusual to see the larger choroidal vessels next to the white patches. In normal eyes, it is only uniformly red. There are

no positive evidences of syphilis, but many indirect signs.

Cerebral Amaurosis. The ophthalmoscopical signs are by no means satisfactory.

Acute or Inflammatory Amaurosis. Mr. Hogg, at page 117, notices a case related by Ruete, in which the amaurosis was sudden; the papilla was hazy, and there was over the centre a black spot with a grey ring; there were retinal exudations, with anæmia of the optic-nerve vessels. And, at page 123, he gives a case of amaurosis complicated with inflammation of the posterior tunics, in which the papilla in the left eye was covered by a dark spot which extended as far as the macula lutea; there was also excessive vascularity of the choroid and retina.

Traumatic Amaurosis. Mr. Hogg, at page 117, relates a case of amaurosis from injury; there were found, besides lenticular opacity and some floating bodies in the vitreous, serous effusion on the retina, and beneath it irregular white patches.

Amaurosis with Congestion. Mr. Hogg, at page 57, relates a case in which the patient had lost the faculty of seeing any but large letters, and a bright star seemed to be constantly floating before the eyes; there was no pain or inflammation. The principal appearances in both were great congestion of the retinal vessels; and the centre of the fundus, over the macula lutea, was covered by a small black spot.

Amaurosis with Effusion. Mr. Hogg, at page 58, relates a case where, with symptoms somewhat like those of glaucoma, in the right eye, the papilla was surrounded by an irregular margin and dark lines of pigment; in the left, the portion of the fundus in

which most vessels were conspicuous was covered by a grey film.

Amaurosis with Hemiopia. Mr. Hogg, at page 39, notices a case in which this was the most prominent symptom. There was cupping of the papilla; a black patch over the fundus, partly covering the papilla; floating pigmental masses, etc. And, at page 40, he describes another case, in which the retina had become partly detached. At page 41, he quotes one from Anagnostakis, in which floating flocculi were observed in the vitreous humour; and a mass which sank to the bottom when the eye was at rest, which he suggests was the remains, probably, of an old hæmorrhagic clot.

Amaurosis with Anæmia. Mr. Hogg, at page 59, gives a case from Anagnostakis, in which an amaurotic state supervened upon attacks of dysentery. An examination showed much congestion of the retina, with many hæmorrhagic patches.

Amaurosis with Exudation. Mr. Hogg, at page 122, relates a case of amaurosis, partial or temporary, where he found the fundus covered in certain spots with irregular white patches. A pinkish cloud looked as if suspended before the papillæ, which were quite undefined at the margins.

Amaurosis Congenital. Mr. Hogg relates a case at page 141, in which, with congenital defect of sight, there were many signs of want of development of parts, a very pale fundus, and general want of pigment. The papilla looked unusually distinct and white. The vessels were very small.

Amaurosis with Nyctalopia. Mr. Hogg, at page 115, notices a case given by Anagnostakis, where, as a

result of injury, nyctalopia came on. He found the vessels of the fundus much congested, and haziness of the tunics from effusion. Near the papillæ were three cretaceous scales, slightly raising the surface.

Myopia, Presbyopia, etc. The defective power of adjustment of the eye to distances, including the affection called asthenopia, may generally be distinguished from amaurosis by negative signs. If we find the fundus and papilla and media in a natural condition, we may conclude that the derangement of vision is caused by loss of this power. Myopia may generally be detected by the ophthalmoscope, by two signs principally: firstly, an unnatural distinctness of the choroid, as well as the retinal circulation, which enables us to see the fundus, often even to trace the papilla, the macula lutea, etc., without the aid of the convex lens; secondly, the myopic arch or crescent, which consists of a bluish white crescent, describing the half or more of a circle, concentric with the margin of the papilla, comprising, at the thickest, about two lines in breadth, often irregular at the margin, and surrounded by a black line or mark, showing accumulation of the pigment. The cause of this appearance in myopic subjects is at present involved in obscurity; but the appearance seems to answer in great measure to that described above, from Desmarres, under the head of "sclero-choroiditis". In both cases, there must be change in the choroidal circulation, and in the distribution of the pigmental elements. The above may be the only ophthalmoscopical signs observable; but, in aggravated cases of myopia, we have others superadded. Dr. Bader, in *Ophthalmic Hospital Reports* for April

1858, states, that he has known this crescent, as well as the myopia, disappear in a woman after her bearing a third child; and, in another case, observed it disappearing gradually, losing its crescentic shape, and normal and choroidal red appearing in its place. The fundus seems to become pale red before the spreading of the crescent. In some cases he states that great myopia is present without the crescent, and the only peculiarity is that we can see the fundus, etc., quite clearly without the convex lens, and sometimes we find cases of weak sight with patches similar to those above described, but without myopia, concave glasses giving no benefit.

Asthenopia is the disease, the essential nature of which is inability to keep the attention fixed long on letters, etc., with loss of adjusting power. We commonly find no signs, but Mr. Hogg, at page 110, relates a case where he found the fundus pale. The retinal vessels covered by a greyish web; the vessels few; anæmic retina, as shown by an unnaturally white papilla.

Glaucoma. There are three principal signs by which we diagnose this affection as regards the ophthalmoscopical characters. Firstly, the optic papilla is altered and cupped. Secondly, the vessels are altered in direction. Thirdly, there is spontaneous pulsation of the arteries. First, cupped papilla. There is a clearer distinction between the papilla and the rest of the fundus than usual; the outer border looks prominent, like a picture frame, and has a yellowish appearance, while the interior has a greenish hue. The choroid in the vicinity shows some maceration of pigment. The vessels at the border are

seen to curve over and disappear, and to reappear in a position differing from what they would have if they had proceeded in a straight direction. This is best seen as regards the veins. Then the vessels are seen to have a pulsation isochronous with that of the heart. All, or any one of these signs may be present. As regards the pulsation, it is to be observed that spontaneous pulsation is observable in some other eye affections, of which amaurosis is the result; and even in the healthy eye of persons in whom general pulsation and muscular action are unusually strong. We can also often produce it by pressing upon the globe while we are observing with the ophthalmoscope. If we press the globe until we distinctly see the arteries pulsate, we shall find the patient's vision diminish from the circumference inwards, until it ceases altogether. This fact may give us some measure of the amount of deterioration of vision following the changes which occur from pressure in glaucoma; but in some cases, where we find a great amount of compression exerted, the vision is not proportionately affected. Mr. Hogg, at page 59, notices a case of glaucoma in which the principal appearances were great congestion of the fundus, with œdema of the retina; the papilla was discoloured by pigment deposit. Also, he mentions other cases in which there were signs of bloody effusion, or simply hyperæmia of the retina. For information on the subject of glaucoma, the reader is referred to articles in the *Ophthalmic Hospital Reports*, by Critchett, Bader, etc.; in the *Medical Times and Gazette*, by Hulke; also reports of a paper on the subject read by Mr. Hulke before the Royal Medical and Chirurgical Society; etc., etc.

PARASITIC BODIES IN THE EYE.

By means of the ophthalmoscope, we are able occasionally to detect parasites, animal and vegetable; and these are by no means confined to the anterior parts of the globe. An interesting case is described and figured in Desmarres (vol. iii, pp. 757-8) of cysticercus in the retina. There were signs of turbid vitreous humour—floating false membranes; the greater portion of the fundus, including the papilla, entirely hid; but, by making the patient look a little below and to the inside, there was discovered a cysticercus thus described. The neck is of a bluish white, evidently agitated at the slightest movement. Once M. Desmarres saw it become shorter, and the head hide itself almost entirely in the body of the tumour. The body is of a brilliant yellow-white colour, seven or eight times the size of the optic papilla.

INJURIES OF THE EYE FROM FOREIGN BODIES.

Mr. White Cooper, in his recently published and beautifully illustrated work on *Wounds and Injuries of the Eye*, remarks, at p. 41, that the ophthalmoscope, in doubtful cases, may render us valuable assistance. If a chip of metal, for instance, has lodged in the vitreous humour, without traversing or wounding the lens or its capsule, it will readily be discovered by the ophthalmoscope, unless buried in such a position as not to admit of its being brought into view. If the lens has been wounded, it will become opaque, and of course prevents the use of this apparatus. And he gives extracts from the works of Jäger, illustra-

tive of this subject ; also, at p. 233, he gives instances of the value of this means of observation, in a case in which, after a wound from a cricket-ball on the globe, sight became extinct ; and, on close examination, there were found a number of brownish flakes floating on the vitreous humour ; and effusion, varying in parts from pink to a chocolate hue, pervaded the retina, covering the entrance of the optic nerve. A distinct dark clot of blood was discernible near the lower and outer portion of the retina. In another case, by means of this mode of examination, he was enabled to speak of the nature of an injury with confidence and precision, where, without it, he could only have hazarded an opinion of what was probable. The eye of a farmer having been struck by a missile, sight was lost. Externally, nothing abnormal, but a dilated and motionless pupil, was seen. The ophthalmoscope showed the seat of a rent in the retina, as an opaque irregular line, nearly in the axis of vision ; and there were many small spots around this, evidently the remains of the coagulum of blood (detected previously by Mr. Dixon) which had not been entirely absorbed. “ In our report, we were enabled to state with confidence that, though Mr. J. might retain a certain amount of sight in the injured organ, we were of opinion that it would never be restored to its former perfection.”

Among many interesting examples Mr. W. Cooper's book contains of the value of this instrument in the elucidation of injuries of the eyes and their effects, are the following :—At page 140 is related a case, in the practice of Gräfe, of a student in whom, after recovery from injury, the ophthalmoscope showed

detachment of the retina in the lower half. The upper half was normal, and the lens and vitreous humour remained transparent. The patient only lost the sight in the upper half of the visual field. At p. 163, he gives an instance in his own practice, in which he was enabled to detect by this means the changes which had taken place in the posterior part of the eye, from an injury, causing retinal effusions, etc. He also relates a case at page 176, where he was enabled to trace double vision, after a blow, to an opaque line on the posterior surface of the capsule; the media otherwise transparent. At page 178 he gives an instance of a man rendered almost totally amaurotic in consequence of a blow near the eye-brow. In former days, this would have been attributed simply to injury of the frontal nerve and its branches; but Mr. Cooper was enabled to detect partial detachment of the retina, bloody coagula, and other changes much more likely than any injury of the external nerves to cause the amaurosis; in fact, such organic alterations as must be to a great extent incompatible with the due performance of the functions of the retina. At page 180, he gives a case of Mr. Bowman's, in which there were detected, after concussion of the brain, abnormal appearances of the retina and choroid, with numerous black spots both before and behind the retina; another case, under Dr. Williams, in which he found the "retina elevated by a turbid liquid, such as is often observed in pericarditis and other serous inflammations". At page 181, he gives a case, under the care of Dr. Van Dommellen, in which, after concussion of the brain, the ophthalmoscope showed the papilla replaced by a

reddish disc ; veins alternately raised and depressed ; arteries very small and pale. At page 235, in a case in which, after a blow, the patient saw a dark cloud before his sight, Mr. Cooper detected a greenish grey mass at the posterior part of the vitreous humour obscuring the retina. As the eye moved, this was jerked up, and then settled slowly down—evidently a coagulum of blood, intercepting the rays of light.

In concluding these notes, we may remark, that formerly it was one of the most rare things to have an opportunity of verifying by subsequent or *post mortem* examination any morbid changes which had been supposed to have taken place in the eye, with the exception of cases of malignant tumours for which the globe had been extirpated. Now that it is the practice of ophthalmic surgeons to remove the diseased globes more often than formerly, instead of leaving them in the orbit, to create irritation and endanger the existence of the sound eye ; and that more pains are taken to form collections of the diseased globes which are removed,—the facilities of comparing diseased appearances with the revelations of the ophthalmoscope have become vastly increased, and thus a wide field is open for improvement of our knowledge of this branch of science, and particularly in the minute anatomy and pathology of the regions ; and, as a result, for more decisive and more certain methods of practice.

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