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TREATISE

UPON THE

NATURE AND TREATMENT

OF

MORBID SENSIBILITY

OF THE

RETINA,

OR

WEAKNESS OF SIGHT.

BEING THE DISSERTATION TO WHICH THE BOYLSTON MEDICAL PRIZE

FOR 1848

WAS AWARDED UPON THE FOLLOWING QUESTION:

"WHAT IS THE NATURE AND BEST MODE OF TREATMENT OF THAT AFFECTION OF THE EYES, COMMONLY CALLED MORBID SENSIBILITY OF THE RETINA?"

By JOHN H. DIX, M. D., M. M. S. S.

"Scribere jussit amor." — Ovid.

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TO

RICHARD MIDDLEMORE, ESQ., M. R. C. S.,

OF BIRMINGHAM, ENGLAND,

WITH HIGH RESPECT FOR HIS CONTRIBUTIONS

TO

OPHTHALMIC LITERATURE,

AND IN GRATEFUL REMEMBRANCE OF HIS HOSPITALITY

TO A STRANGER,

THESE PAGES ARE INSCRIBED.

The following votes were adopted by the Boylston Committee in 1826 : —

1. That the Board do not consider themselves as approving the doctrines contained in any of the dissertations to which the premium may be awarded.

2. That in case of the publication of a successful dissertation, the author be considered as bound to print the above vote in connection with it.

PREFACE.

The complaint to be treated of will perhaps be recognised by but few persons out of this region, under the name assigned to it in the question announced by the Boylston Medical Committee. It is elsewhere most spoken of as weakness of sight, amblyopy or partial or incipient amaurosis.

Admitting the necessity of a distinctive scientific appellation for a disease which can with no propriety be classed under any other, and objecting to the term morbid sensibility of the retina as not expressing its true pathological condition, I would suggest the borrowing and appropriating to it the word Asthenopy, as being if not actually explanatory, at any rate not false in its signification.

The remarkable frequency of this complaint here, where in fact it may be said to be among the intellectual classes of society the prevailing affection of the eyes, and the fact that medical literature furnishes no distinct treatise or chapter upon it, that its nature

is hitherto unexplained, are considered to be sufficient reasons for the publication of these pages, however imperfectly the purpose attempted in them may have been accomplished.

J. H. D.

Tremont Street, Nov. 20, 1848.

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TREATISE.

SYMPTOMS AND DIAGNOSIS OF MORBID SENSIBILITY OF THE RETINA.

The term "morbid sensibility of the retina," strictly speaking, ought, I presume, to imply something anormal in the discharge of its appropriate functions, some peculiarity of vision. The only condition of vision, which perhaps fully satisfies the term, is one which it has been my fortune to meet with only twice, and which, if spoken of at all, is not mentioned by any writer as a distinct disease.

It is a persistence of the visual impression upon the retina for an unusual time after the object which occasioned it has passed from the field of vision; a phenomenon which in a very slight degree may be observed by any one, who, after looking intently at a very brilliant object, or even a dark one contrasted with a strong light, turns his eyes suddenly to another. In two cases of amaurotic affection, this has been

stated to be, at some periods, the habitual result of ordinary application of the eyes. The most striking, and the only one of which any memorandum is retained, was that of a lady, who was, when she presented herself, totally blind with the left eye, the pupil of which was largely and immovably dilated. She stated that the first inconvenience she had ever experienced in seeing was, in having the image of any object, at which she had been looking for a minute or two, impressed upon every object at which she looked for the next one or two minutes; that, for example, after looking at a plaided, or other figured surface, she saw, for about the same period immediately afterwards, the same figure impressed distinctly upon the face of every person she met, the colors being for some twenty seconds about as vivid as when actually seen, and then fading gradually away.

So rare an affection as this, however, can hardly be the one contemplated in the announcement of this subject, and the term "morbid sensibility of the retina," has, in some parts of this country, at least, been by common consent applied to a very frequent disease of the eye, in which intolerance of use is the essential, and the only invariable, symptom.

But though intolerance of use alone, unaccompanied with any objective indications of disease,

either in the globe or its appendages, may be considered to represent the disease called *morbid sensibility of the retina*, in its primary and simplest form, it is seldom presented in this condition to medical observation. Sometimes, at the commencement of the complaint, but usually at different periods afterwards, other symptoms occur, one or more of which, in connection with the mere intolerance of use, first suggest a resort to medical aid, and most of which sooner or later combine to form the cases classed under this denomination.

The intolerance of use, which has been spoken of as the primary symptom, is in the earliest stages of the disease indicated, for the most part, by a dull, heavy pain over the brows, or deep in the orbit; sometimes by a sensation referred to the anterior portion of the globe, in which the patient is unable to say whether smarting or pain predominates; sometimes by a sensation of heaviness in the top of the head; less frequently by a sharp, darting pain through the globe; and more rarely still by a sensation of uneasiness altogether indefinable, or by a mere sensation of pressure in or behind the globe, or of itching upon the surface of it. An impression of weight in the lids, and a slightly painful, but, for the most part, indescribable sensation upon the cheek, along the lower margin of the orbit, are

in some cases, either singly or united, the first, and for a time the only indications of intolerance of use, but are commonly, when observed, coincident with some of the preceding. The sensation of excessive weight in the lids may be so decided, that the patient shall represent himself as unable, at times. to open them, until after repeated efforts; the time at which it is most annoying being on the morning following a day, during which the eyes have been over-used. Sometimes a tired feeling in the eye, analogous to the sensation of muscular fatigue, is spoken of as the first indication, but this also is usually coincident with, or very soon followed by, some other. In some cases the pain induced by over-use is felt only, or chiefly, in turning the eyes. The amount of use sufficing to produce them, and the periods intervening between the cessation of use and their occurrence, are as various as the intensity and duration of the sensations themselves. The attempt to read a word may be followed by one or more of these sensations, and close application of the eyes, for ten or twelve hours, may produce them only after the same interval of repose. In general, however, it is found, at the commencement of these cases, that the amount of use which can be borne is greater, the sensation of pain less, and the interval preceding its occurrence longer, in cases

referable simply to excessive use, than in those which other predisposing or exciting causes have contributed to produce, although in the latter the accustomed use has been comparatively slight. In cases originating solely from excessive use, the progress of the complaint is least rapid, but in nearly all, sooner or later, other symptoms than those which have been attributed to simple intolerance of use, occur.

Setting aside a few presbyopic cases, relievable commonly by rest and convex lenses, intolerance of use, in seventeen out of twenty cases in which I was able to satisfy myself on this point, and in which the complaint had existed for not less than a year, was followed, at periods varying from a few days to a year, by other symptoms, which will be enumerated in the order in which they are most likely to come on.

A visible *injection of the blood-vessels of the conjunctiva and the sclerotic*, or, more correctly speaking, the aponeurotic expansion of the recti muscles around the cornea, together with an *increased flow of tears*, and in some cases a sensation of heat, are so early and frequent symptoms in the history of these cases, that they might, with almost as much propriety, have been mentioned among the immediate indications of intolerance of use. But it will be found by close examination, that, in at least three fourths of

these cases, the first inconvenience resulting from over-use, was not accompanied by redness of the eye or a flow of tears. The injection is diffused, and never very great, but if the application or other exposure of the eyes be persisted in after they have begun to be uncomfortable, the redness will increase, especially in the vicinity of the cornea, presenting faintly around it the pinkish zone which characterizes iritis and inflammations of other internal textures; a fact which will be adverted to in another connection. Although in some few cases, according to my own observation in five out of twenty, these symptoms are never recognised, it may reasonably be questioned if they would not appear, provided the patient were persevering or reckless enough to continue to apply his eyes sufficiently long after suffering has admonished him to desist; and, if they do not appear in the history of the case, the medical adviser could not feel himself justified in urging an experiment for the solution of the question. In estimating the proportion of cases in which these symptoms appear, presbyopic ones have been set aside, not because in the few which I have seen these symptoms have not been observed, but because, in most of them, rest, and a few general cautions only, with a resort after a reasonable time to an optician, being deemed necessary, no record of them was made. In this

estimate, also, cases were of course set aside, which had been recently preceded by, or were at any time complicated with, inflammatory affections of the external textures of the eye or its appendages.

An *undue sensitiveness to the impression of a strong, and especially a cold wind*, is a symptom met with in about half the cases of this disease, and is named here because it is oftenest found in connection with the two last named. It is said to consist in a feeling of rawness of the surface, and is sometimes met with in the most intense degree in eyes which have never exhibited any visible signs of affection of the conjunctiva. It is sometimes so extreme as to be excited by using a fan, or walking in a still atmosphere. In some few cases the impression of a cold air is found to be peculiarly grateful.

Intolerance of light is probably the next symptom that will arise, and its indications are much the same as those which mark intolerance of use, but are commonly, in the early stages of the complaint, much less decided, unless the exposure has been a very extraordinary one, such as looking at the sun, or a hydro-oxygen blow-pipe. It is of course more readily induced by artificial light than by that of day, and by direct or reflected, than by diffused light, and, as is the case with intolerance of use, the suffering which

indicates it may occur at once, or not for ten or twelve hours. This intolerance of light is to be distinguished from the photophobia which characterizes some other affections, such as strumous ophthalmia and retinitis, not merely because in the early stages of the complaint it is less violent, but because it is not attended by the "dazzling, blinding sensation," and because the suffering incident to it does not in general follow immediately upon the exposure, but some time afterwards. It is especially to be remarked, that the intolerance of light, peculiar to morbid sensibility of the retina, differs from the photophobia of other diseases, in being dependent, not so much on the character or excess of the light, as upon its changes, and upon the fatigue undergone by the eyes previously to being exposed to it; that from the intolerance of use, arises the intolerance of light, while there is not reciprocally any essential increase of the intolerance of use after the patient has begun to be intolerant of light; that, for example, a person having brought on pain by over-use of the eyes, will not encounter with ease an amount of light which would otherwise have given him no inconvenience; and that the same person will experience but little, if any more difficulty, in resuming the application of his eyes, than if it had been steadily continued. This last state-

ment is not one of universal application in this disease, but will generally be substantiated by close observation. In some severe and long protracted cases, it must be admitted, that the intolerance of light amounts to, and can in no way be distinguished from, the photophobia of other diseases; but in such cases it will almost always be found that the disease has become complicated with some, although it may be a very slight imperfection of vision; some unequivocal token of disease of the retina itself. In a case of simple morbid sensibility, I have never known intolerance of light to precede intolerance of use, although in some very few cases the two symptoms may be found to commence simultaneously.

In connection with extreme intolerance of light, or photophobia, in these cases, ought probably to be mentioned a symptom with which I have never met, but of which Beer says: — "In some rare cases of incomplete amaurosis, the sensibility of the retina to light is so much increased, that the patient avoids all places where there is a strong light, particularly where strong reflected light falls on the eye, and seeks comparative darkness — protecting the eye, when he goes abroad, with a green shade or green spectacles. This state passes under the name of intolerance of light, or photophobia. Under such circumstances, the patient sometimes

discerns for a short time, that is, for a few moments, or more rarely for a longer period, even the smallest objects, in an extremely weak light, as clearly as the best eye can see them in the light of day; while, at other times, he cannot distinguish even larger things in the same light. This state, which is called oxyopia, that is, acuteness of sight, (from ὀξυς, sharp, and ὀψις, vision,) deserves the particular attention of the practical surgeon." — *Lehre*, vol. ii. p. 426.

Tenderness of the globe to pressure, is a symptom to be met with in about one fourth of the cases of simple morbid sensibility, at some period or other. It is of every possible degree. It is in many cases constant, being observable at times when the eyes are perfectly free from pain, and the other inconveniences resulting from use or exposure; but it is usually increased with, and sometimes comes on only in connection with, them. It is commonly equal in both eyes, the other symptoms being the same in both, but not always; and in some few instances I have known it to alternate from one eye to the other for periods of a week, or a month or two, without any corresponding change in the condition of the eyes in other respects. I have never ascertained it to be one of the symptoms first observed, but this may be because the attention of a patient would not probably be attracted to it until he

found it necessary to consult a physician. In general, it does not take place until a considerable amount of pain has begun to be experienced from use, or exposure to light, or both. Its existence may be considered as having an unfavorable bearing in giving the prognosis of any case; certainly those cases under my own observation, in which this symptom has been most decided, have been the most obstinate and persistent. On the other hand, the lessening or disappearance of this symptom is often the first step towards a temporary or permanent relief; but cases in which it does exist, or has existed, are especially liable to relapse, from slight or altogether undiscoverable causes, when they are apparently progressing towards recovery. Analogous to the tenderness of the globe on pressure, is pain from merely turning the eyes, and also a sensation which I have met with, in a few cases, of pain in the action of closing the lids. This pain was referred to the edges of the lids as they come in contact, and was confined to the neighborhood of the outer canthus, and described as an aching pain.

In some cases, in connection with the tenderness of the globe, on pressure, and in others without it, *a tenderness on pressure at the edge of the orbit* is observed. It is greatest at the outer side, sometimes extends from thence along the

edge of the orbit as far as the seat of the lachrymal glands, and very rarely along the whole superior margin. It is somewhat more uniform than the tenderness of the globe, and less liable to be increased by the occasional causes of fatigue and excitement, but, like it, indicates an obstinate case of probably long continuance.

Another, and a more frequent one than the last named symptom, is a sort of *itching, crawling sensation in the skin*, commencing on the temple, and gradually extending below the lower lid. It is often stated to have preceded, by some years, what the patient would consider to be the commencement of his complaint, but sometimes comes on at a later period. In those cases in which it does exist, it will almost invariably be the first in the train of symptoms which constitute what, for want of a more suitable term, may be called a paroxysm of the disease; and it frequently becomes noticeable to the patient, not so much on account of the present discomfort it occasions, as because experience has taught him that it is the prelude to a period of unusual sensitiveness of the eyes. Of this, as well as of the two preceding symptoms, it must be said, that it indicates a peculiarly intractable case, in which no encouragement for a speedy recovery can be given.

A sensation of *coldness of the globe*, indepen-

dently of temperature, or exposure to air, is a symptom occasionally met with, but one of no especial significance. It is not an early symptom, never a constant one, and not more likely to occur at one time than at another. It is worth remarking, that I have never heard it spoken of in diseases wholly unconnected with this, except in a few cases of iritis.

A sensation of *excessive heat* in the eyes is sometimes complained of, without their indicating to the touch any elevation of temperature, and without any visible injection or suffusion.

A *temporary dimness, or disturbance of vision*, is the most important symptom remaining to be spoken of among those which belong to a simple case of morbid sensibility. The eye having become, as the patient often expresses it, tired of looking, small objects, such as letters, begin to be blurred, indistinct, and run together. Sometimes the object itself appears distorted or misplaced, occasionally more or less distant than it really is. If, after vision begins to be thus disturbed, use is still continued, a more or less dense cloud, or haze, will invest every object, and this haze is not uncommonly described as having a glimmering, flickering movement which is especially annoying. In one case which I have met with, when use had been persisted in for a half hour after a disturbance of vision was

first perceived, objects became not only indistinct, but acquired a sort of pulsatory vibration, which the patient stated to be synchronous with her pulse. Muscæ volitantes also appear in the field of vision in the early stages of the complaint, translucent, like drops of water, or like air condensed into globules, rings, or curved lines, separate or linked together in every possible manner, which, when attentively examined by the patient, present, according to Mackenzie, "an appearance of minute, twisted tubes, partially filled with globules, which sometimes appear in motion." The opaque, dark muscæ also, though less frequently, appear in the simple form of this disease, and when they do, are for the most part of a brownish hue and always small. When they are quite black, or of sufficient size to render apparent any difference in the density of the centre and edges, when they gradually enlarge after their first appearance, and especially when, instead of being visible merely when looking at a bright surface, or after fatigue, one or more of them can be recognised with the eyes closed — there is reason to suspect a complication with, or a tendency to, amaurosis. Many authors consider that the two kinds of muscæ are specifically distinct, the semi-transparent, or translucent ones, being never, and the opaque ones frequently, the precursors of amau-

rosis.* Luminous, or vividly-colored muscæ, are not met with in simple cases of this disease. In some few cases this temporary disturbance of vision is attended with a degree of chrupsia, or rather with one of the phenomena which are ordinarily grouped by authors under that head; the outline of every object appears to be invested with a prismatic halo, an appearance precisely similar to that which is occasioned by looking through any optical instrument which is ill adjusted, or unprovided with achromatic lenses. This particular form of chrupsia has in fact been suggested to depend, probably, upon a loss of achromatic power in the eye, in consequence of a "derangement of its lenses." The other phenomena of chrupsia, a general, uniform false coloring of objects and colored spectra, which are sometimes, though incorrectly, classed under this head, do not occur in simple morbid sensibility, and are unquestionably indicative of amaurosis.

Muscæ volitantes, which may, or may not be permanent, being excepted, the affection of vision which comes on during a paroxysm of *morbid sensibility of the retina*, whatever its kind or degree, passes off almost simultaneously with its exciting causes; and it is this limited duration

* Mackenzie, Sichel, Florent Cunier, and Himly.

chiefly that distinguishes it from the imperfect vision of amaurosis.

It may come on at any period of the disease, but it is almost always preceded for a longer or shorter time by several of the other symptoms, and is in general the last which will be developed. Having been developed, however, it does not keep pace in their increase, with the intolerance of use, the intolerance of light, the injection and suffusion, and tenderness on pressure. While these symptoms, month after month, acquire greater intensity, the affection of vision remains about the same as when first noticed, although it will be induced more speedily, and from slighter causes.

In some cases it is nothing more at first than the effect of the excessive flow of tears over the cornea. It may never occur at all, and is not to be looked upon as an essential feature of the disease. In twelve out of forty otherwise well marked cases of this disease, no imperfection of vision was remembered to have been observed at any time.* It is hardly necessary to say, that in this statement no reference was had to myopy, it being rather a condition than an imperfection of vision. Whether in some, or all of these twelve cases, a greater provocation,

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* See the Table.

a longer continuance in the use of the eyes, would not have brought on dimness, or some other affection of vision, is a question which of course admits of no answer. An extreme morbid sensibility, is at all events not incompatible with perfectly clear, distinct vision; the patient may be scarcely able to endure the pain of applying his eyes for a minute, and yet see as well as ever.

Muscæ have just been spoken of as one of the forms in which the temporary affection of vision may manifest itself; but inasmuch as they often become permanent in the intervals, as well as during the paroxysms of the complaint, they require also to be noticed as a distinct, separate symptom. Having probably for some months appeared and disappeared in the train of the other symptoms, the patient will find that they pass off more slowly, remaining for a short time after the eyes have in other respects recovered from their fatigue. The period of their stay is gradually prolonged, until they become a permanent accompaniment of vision, without interfering with its distinctness, except, as has been remarked above, in cases tending to amaurosis. Fixed muscæ, or spectra, by which is to be understood those having no other apparent motion than that which belongs to the eye, also occur in a few cases of simple

morbid sensibility, and continue without impairing vision. They are usually dark, well-defined spots, and, far more than the floating muscæ, imply an amaurotic character or tendency.

Under this head perhaps ought also to be spoken of, the *ocular spectrum*, or the image which remains upon the retina when the eyes are closed, or turned away after intently gazing at a very brilliant object, the form of the object being preserved, while its color (except in one variety, the direct ocular spectrum) is variously modified or changed. They have been very minutely described and classified by Dr. Darwin; * and an eminent authority † says of them: — "Certain of the muscæ volitantes complained of by people of delicate constitutions, when their eyes are a little weakened by fatigue, are probably ocular spectra of this kind." But in those cases of morbid sensibility which I have had an opportunity of observing, the ocular spectrum has never been spontaneously alluded to, by the patient, among his troubles; and by those, of whom I have recently taken occasion to inquire, it is not stated to have been, since this disease came on, more observable than by the eyes of

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* Philosophical Transactions, v. 76, p. 313.

† Mackenzie, p. 616.

persons in general, or by their own previously to the disease.

Although *muscæ* are not uncommonly a late symptom, or result of morbid sensibility, they are often also one of its antecedents. They may precede this disease for years, and remain unchanged, or be only slightly modified in its course. Out of forty cases, muscæ had previously existed in six, and in eight cases came on in the course of the disease.*

Myopy is a very frequent symptom, or rather accompaniment of morbid sensibility. In many cases it is the first, and in some the only peculiarity of vision which ever takes place. The patient often states, that just about the time when he first began to experience pain from use, and before any temporary confusion or dimness of vision took place, he found himself getting near-sighted. Myopy having once commenced, it generally, but not invariably becomes a permanent condition of vision, and in four cases at least I have known it to diminish materially with the subsidence of the morbid sensibility. It ordinarily increases with the progress of the disease, as long as the patient continues to make any application whatever of the eyes to near objects. It is by no means an improbable sup-

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* See the Table.

position, that in some cases the confusion and dimness of vision, incident to the use of the eyes in morbid sensibility, are nothing more than an extreme, sudden, and temporary myopy. If this supposition could be established as a fact, it would very much help to elucidate the pathology of morbid sensibility. The appearance of muscæ volitantes only excepted, there is nothing in the affection of vision in a case of morbid sensibility, which may not occur to a myopic person, endeavoring to read at an impracticable distance. There is in both cases a similar blurring and running together of letters, and gradually an entire disappearance of them. Moreover, if a person with morbidly sensitive eyes, finding after use his vision fading away, brings the book suddenly nearer to his eyes, he will momentarily see clearly, and in some four or five cases within my own observation, after the dimness of vision has come on, it may be relieved for a short time by the use of a lens, generally concave, but sometimes convex. This fact was first suggested to me by a young dentist, who stated that in his own case, after the indistinctness of vision had been induced, putting on slightly convex lenses enabled him to resume his labors for a short time. Lastly, the very large number of myopic persons who acquire a *morbid sensibility of the retina*, and of persons laboring under this disease

who become myopic, points to a close relationship between the two affections. Of forty persons suffering from morbid sensibility nine had been previously myopic, seven became so during the disease, and in two, the myopy previously existing very sensibly and rapidly increased.*

Presbyopy, in a few cases, or rather a very rapid increase of it, may be regarded in a certain sense as a symptom or result of morbid sensibility. Morbid sensibility of the retina, when it comes on late in life, is, I believe, always traceable to an effort to apply the eyes after they have become presbyopic, either without convex lenses, or with ill-selected ones, and on the other hand, the circumstance most alarming to the patient in these cases is always the very rapid increase of the presbyopy. The influence of this disease in disturbing the adjusting power of the eye, by promoting both near and far-sightedness, will hereafter be spoken of as throwing some light upon its nature.

Of objective symptoms, there are none in simple cases of morbid sensibility of the retina diagnostic of the complaint, except perhaps the downcast, shrinking aspect of the eye, when intolerance of light has supervened. Visible injection and suffusion occur in too many

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* See the Table.

others to be considered so. Nor, according to my own observation, is any thing diagnostic to be observed in the condition or movements of the iris, although I have two or three times heard it asserted by patients that their pupils had become smaller than they were originally. An extreme contraction or dilatation, or any peculiarity of the movements of the pupil I have never seen, except where some other disease was complicated with this.

Although the prominent, and certainly all the essential symptoms of morbid sensibility of the retina have been separately dwelt upon, there are many sensations, of which patients describing their cases may speak, which have not been noticed, and from their infrequency and vagueness hardly require to be. Such, for example, are tenderness on pressure over the whole scalp, or on some particular spot; a "raw, smarting sensation just on top of the head, in a space not larger than a cent;" shooting pains remote from the eyes; a stiff or burning sensation in the skin about the orbit; a sensation of thickness or stiffness in the lids; a sensation in the globe of dryness, throbbing, dragging or pricking, or "as if the eyes were inverted," or as if there were some foreign substance in them.

For the most part, the symptoms are the same, and have the same intensity in both eyes, but not

always. In thirteen out of forty cases the eyes were unequally affected, and in three of the thirteen the focal distance was not the same in both eyes.* In eight the suffering was greatest in the right, and in five in the left eye, but in seven of these some other disease had previously been experienced with more severity in one than the other. I have never known one eye alone to be the subject of this disease.

But the statement of a few cases as they present themselves, will make the definition of this disease clearer than any detail of symptoms can possibly do.

December 17, 1846. Mr. ——, of ——, music teacher, aged 28, five years ago was attacked with an inflammation of the left eye, from which he recovered. For two years past, in connection with his ordinary agricultural pursuits, he has been studying and giving lessons in music, chiefly in the evening. Three months ago he found that use of his eyes for a few hours brought on a smarting or itching sensation in them, and if the use were continued sufficiently long a dull pain around the orbit, succeeded on the following morning by a heavy feeling in the lids. The period during which he could use them

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* See the Table.

with comfort has shortened, until it is at present not more than a half hour, and for a few weeks past he has experienced pain of the same character from exposure to artificial light. Vision perfect at all times, except that for the past three years he has seen occasionally some translucent, S-shaped muscæ volitantes before both eyes. Thinks they are not more numerous or frequent since his eyes became troublesome. Iris grey. Hair and complexion light. Health not robust, troubled occasionally with flatulence and acidity, and disagreeable sensations in the head and epigastrium, which he calls nervous, and attributes to energetic depletory measures adopted some years ago for the relief of his left eye.

January 5, 1847. Miss ——, aged 23, schoolmistress, had ten years ago an attack of inflammation in both eyes, and four years later a second, for which very energetic treatment was adopted, leeches and blisters being freely resorted to for some two months. Six years ago, being then eighteen, and having attended school for some years assiduously, she found her eyes in the afternoon weary, and if she used them by artificial light, painful. She left school, her eyes became strong, and three years ago she began to teach. In four or five months she felt a recurrence of the same symptoms which came on just before she left school. The eyes have gradually

become more troublesome. Now there is constantly an uneasy sensation, as if she had been awake during a whole night. Use of the eyes for a half hour very much aggravates this sensation, and, if it is continued for one or two hours, brings on a pain deep seated in the orbit. Often feels from exposure to a strong light, if on the preceding day she has been using her eyes too much, a sharp prickling pain, she cannot say whether in the lids or globe. Pressure relieves the pain. Iris hazel. Hair and complexion dark. Health good, except a tendency to constipation. Habits sedentary.

July, 1846. Miss ——, aged 16, a year ago having studied and sewed by a solar lamp, found at times a sort of itching, crawling sensation, on the temple and lower lid of the left eye after use. She has now this sensation below both eyes, often without any use or exposure to light. Exposure to use, and strong light, brings on a pain in the globes, often extending to the back of the head; and if she reads for ten or fifteen minutes, the letters begin to dance, and in a few minutes cannot be distinguished. After a few minutes' rest she sees clearly. After the pain has been induced, the slightest pressure causes a feeling of soreness in the globes. Has been near-sighted since her twelfth year. The myopy has increased within the last six months very fast,

and she now reads with the right eye at the distance of six inches, and with the left eye at the distance of four inches. Has worn concave lenses for two years. Iris dark grey; pupils large. Health good, except that she menstruates only once in six weeks. Habits active. Had when very young some disease of the lids.

January 6, 1848. Dr. ——, aged 33, four years ago began to be troubled with his eyes; at first, simply a disposition to close the eyes and sleep, after use. Some time later, he began to feel in addition, after use, a pain, deep seated, in both. Some injection accompanied these periods of fatigue from the first, but at no time was any dimness of vision perceived. A strong wind always causes discomfort, a sort of raw feeling on the surface of the globes. Experiences no inconvenience from strong light immediately, but thinks that on the succeeding day some inconvenience does result from it. A slight fullness in the vessels of the lower lids. He had from his second year a strabismus of the left eye, but not within his remembrance. Has never seen with this eye to distinguish faces. For two or three years past, has seen small, dark muscæ volitantes, ranging in number from one to three. Iris, hazel. Health good, except that about the time of the commencement of the affection of his eyes, he had jaundice, and has occasionally since been troubled with it slightly.

July 11, 1844. Mr. ——, aged 26, seven years ago, dating from last winter, while at school was attacked with an inflammation of the edges of the lids, accompanied with some redness of the globes. In the course of six weeks they became so troublesome that he could not read more than an hour daily; he left school, and applied for medical advice. After using a collyrium some weeks the inflammation subsided, the eyes and lids becoming in appearance perfectly natural, but being quite as incapable of use as before.

On the approach of the following winter he resumed his school, and the lids and eyes again became inflamed. A blister was applied on the back of the neck, the visible symptoms of inflammation disappeared, but the eyes became rapidly painful from use, and intolerant of light, so that at the end of a fortnight it was difficult to render any apartment sufficiently dark to be comfortable to him. Cupping, he thinks, about this time relieved the pain somewhat, but did not enable him to bear light any better. A seton was worn for three months without any sensible advantage, and during the same period leeches were applied at times. Shower-baths were next resorted to in connection with carb. ferri internally, and his eyes gradually became stronger, until, as he thinks from a dyspeptic habit which supervened, they again became worse.

For four years past he has abandoned all treatment especially directed to the eye; but has at several times resorted to medicine, with reference to his general health. During most of the time for these four years, he has been obliged to close the eyes, and remain in a darkened room. Two years ago he took, twice a week, a warm bath for two months, from which he thinks sensible good resulted to his eyes. For the past year they have been as at present.

Now he cannot open his eyes out of doors, except for a few moments on a very cloudy day, and behind two thicknesses of gauze. He has no pain, except from an attempt to look at something, or from exposure to light. The effort of looking at his food when eating, gives pain. The pain is rather above and around, than within the orbits, and accompanied with a suffusion and injection of the conjunctiva deepest near the cornea. Over the left brow, is a place tender on pressure, and numb, and corresponding as he says with a similar state over the left hypochondrium. The tenderness over the brow extends along the edge of the orbit to the outer canthus. Vision good, except that for two years past, when he exposes the eyes to sufficient light, one or two small fixed dark muscæ appear to the left eye. A slight external strabismus exists of the right eye, of which he has never heard before. Iris

dark grey. Pulse ninety-four. His mother and one brother have had, as he thinks, a similar affection in a less degree. Is now dyspeptic. Meats and all stimulants oppress him, and a very laxative diet is required to keep his bowels open.

With one case even more extreme, and of longer duration than the one last detailed, I remember to have met, but have no record of it. It was of a gentleman, who, for the greater part of twelve years, was compelled to remain with bandages over his eyes, in a room which, to his visitors, appeared totally dark. Twice during this time he had been able, with his eyes very much shaded, to go abroad for a few months, but not to apply them in the least. His vision, when he had been able to test it, was unimpaired.

In the diagnosis of morbid sensibility of the retina, it is necessary not only to be assured that the symptoms do not result from an inflammatory affection of any of the internal textures of the globe, but also to ascertain that no external cause of irritation exists, either upon the surface of the globe, or in its appendages, and in very many cases to take into consideration the past

history, not less than the present condition of the patient. By neglecting to do so, many diseases are liable to be confounded with it.

Chronic iritis presents many symptoms in common with morbid sensibility of the retina. The supra-orbital pain, the tenderness on pressure, the slight pinkish zonular injection around the cornea, the increase, and, in some cases, the occurrence of these symptoms only after use or exposure, are, together with a slight obscuration of vision, and in some cases the absence of any injection whatever, characteristic of both diseases. But in chronic iritis, it will be observed, that vision is not perfect, even when no exertion of the eyes has been made; that there is always a stiffness in the motions of the iris; in most cases, some irregularity in the pupillary margin; and in some a discoloration of the iris; this last, however, being much less frequently met with in cases of chronic, than of acute iritis, in which the disorganization has proceeded to the same extent. In chronic iritis also, it will be found always that the disease commenced, and has for a long time existed in one eye only. If these means of discrimination are not satisfactory, the use of some dilating agent, as stramonium or belladonna, will, if the case be iritic, render apparent in the pupil irregularities which were not so before.

From acute *retinitis** and *choroiditis*, it is distinguished by the suddenness of the attack, the violence of the local symptoms, and the presence of constitutional ones in these diseases; from chronic retinitis, by the dull, turbid look posterior to the pupil in the latter disease; from chronic choroiditis, by the absence of the bluish tinge of the sclerotic; and from all of them by the permanence and gradual increase of the imperfection of vision which accompanies them. That the diagnosis with reference to these diseases be correct, is of the utmost importance, while it is sometimes difficult to be arrived at, and in a few cases which have subsequently come under my own observation, has been incorrect. The specific treatment which in iritis or retinitis is alone to be relied upon, and which, to be of the greatest possible benefit must be resorted to at an early stage of these complaints, would in a case of simple morbid sensibility of the retina, be at any time worse than useless.

Neuralgia of the globe of the eye, were it not for the agonizing pain which attends it, might

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* Dr. Rosas ascertained, by post-mortem examination, that in acute retinitis, only that portion of the retina which is in the immediate vicinity of the yellow spot (gelbe Fleck) is affected.—*Handbuch der Augenheilkunde*, Vol. ii. § 780, *Wien*, 1830.

at times be mistaken for morbid sensibility of the retina, but is generally distinguishable from it by the regularly intermittent character of the pain, by an occasional sudden contraction or irregularity of the pupil, by the cessation of neuralgic pains in some other part of the body, by its location in one eye only, and in its later stages by the loss of vision and gradual atrophy of the affected organ.

Morbid sensibility of the retina may be mistaken for, and has indeed been written of as a form of *amaurosis*. Amblyopia, or incipient amaurosis, if, as is often the case in its earlier stages, it is attended with pain, presents many features in common with morbid sensibility of the retina, but is to be distinguished from it chiefly by the temporary duration of the affection of sight in the one, and its permanence in the other. In amblyopia, use or exposure may enhance the defeat of vision, but the patient at no time sees perfectly; in morbid sensibility he never sees imperfectly, except after the eyes have been fatigued, or subjected to some cause of discomfort, as a bright light or a cold wind.

There is generally also a difference in the character of the affection of vision in the two diseases. In morbid sensibility it is an indistinctness, a blurring, fading away, confusion, and in some cases distortion of objects. In amblyopia,

it usually admits of a more definite description. A portion only of objects, as the upper or lower, the right or left half, may be seen, or those objects only may be visible, which are in a certain direction from the eye; or objects may appear to be doubled, tripled, or otherwise multiplied, or their color may be entirely changed, (chrupsia,) or they may seem to be enveloped in a haze capable of being described as smoky, cloudy, or gauze-like. In morbid sensibility of the retina, the amount of light in which an object is seen, does not unduly modify the perception of it; in amblyopia the light often requires to be very carefully adjusted, in order to give the patient the best vision of which he is capable.

Of amblyopia far-sightedness is frequently an early symptom, or rather the vision of distant objects is less obscured than of those which are near. Of morbid sensibility in early life, myopy is a very frequent consequence, although, if a person be already presbyopic, he will become more so during the existence of a morbid sensibility of the retina.

When the present symptoms of a case are ambiguous, its past history will often help to determine with which of these two diseases it is to be classed. In amblyopia the imperfection of vision is the first, and in some cases the only

symptom; in morbid sensibility of the retina, the disturbance of vision has probably been preceded for a considerable time by pain or suffering of some sort in the eyes.

It is of great practical importance also to discriminate between these diseases. Amblyopia is often sympathetic with some disorder of the system, near or remote, by removing which the amblyopia will be relieved; morbid sensibility is a local affection, originating for the most part in causes directly affecting the eye, in the treatment of which, although attention to the general health cannot be too much insisted upon, no marked or speedy improvement is to be looked for from the removal of some other complaint. In amblyopia, its cause being unknown, an empirical resort to mercurials is justifiable, and often successful; in morbid sensibility of the retina, never.

Strumous ophthalmia, when no ulcer or pustule is visible, and in mild cases inflammation in general, such as *simple*, *catarrhal*, *and rheumatic ophthalmia*, might, in the earliest stages, be confounded with morbid sensibility of the retina, but can easily be distinguished from it by the predominance and permanence of objective symptoms in them, and by the manner of their commencement. A very slight degree of ophthalmia tarsi or tinea ciliaris will sometimes render the

eyes incapable of long continued use, and keep them in an irritable state, resembling very much true morbid sensibility of the retina; and as they are exceedingly variable in amount at different times, may occasionally, if the patient is cleanly in his personal habits, be overlooked, but will always be recognised by inquiring as to the condition of the edges of the lids in the morning.

A slight roughness, or *granulated condition of the conjunctiva of the upper lids*, may be, and very often is mistaken for morbid sensibility of the retina. It often results from a mild attack of catarrhal ophthalmia, and is of frequent occurrence upon our Atlantic sea-board. It can be discovered only by everting the lids, but may be suspected if the patient complains of an occasional gravelly sensation in the eyes, or if he refers back the origin of his complaint to an attack of inflammation or "sore eyes."

There is also another condition of the eyes occasionally met with, very likely to be confounded with, and in some cases I believe absolutely indistinguishable from true morbid sensibility of the retina. It is an irritability of the eye to ordinary influences, resulting from mere want of habit of use and exposure. A protracted rest and exclusion from light, especially if continued beyond the time required by the exigencies of any disease, may create it. For

example, a case of chronic opththalmia or morbid sensibility being recovered from, the patient may still shrink from light, and profess himself incapable of using the eye. The disappearance of any of the objective symptoms which had formerly existed, or a more indefinite character in the sensations of which the patient complains, may sometimes give a clue to this condition; an assurance of which can be arrived at only by trial, and the relief of which can be effected only by a judicious, gradual, and persevering exercise and use.

LOCATION AND NATURE OF MORBID SENSIBILITY OF THE RETINA.

Upon the pathology of this complaint very little light is thrown by ophthalmic literature; there is no agreement among writers as to the textures of the eye more immediately implicated in it, or the character of the affection itself, and it is difficult to find any two authors giving to it the same designation.

It is popularly known here and in Europe as "weakness of sight," and it may be doubted if science has yet furnished for it any name more appropriate or pathologically correct. Among the few professional writers who recognise it at all as a distinct disease, are the following, most of them of recent date.

Mackenzie, in his general treatise upon diseases of the eye, if he speaks of it at all, does so under the name of amblyopia, (page 637,) but gives to it no description or definite meaning. He has, I believe, subsequently in some journal, not now within my reach, written upon it more at large, under the name of asthenopia

Mr. Middlemore, in his able and elaborate work, does not speak of it in any connection that I can find. Mr. Tyrrell (vol. ii. p. 112,) probably has this affection in view in a few remarks headed "Congestion of the Retina."

Dr. J. C. A. Franz devoted to it a page, (p. 196,) under the title *weakness of sight*, and considers it to be a disease, resulting from a diminution of strength in the sensitive part of the eye, and most frequently in the retina."

Mr. Lawrence distinctly recognises it as "*affection of the retina from excessive employment*," and describes its symptoms well, but briefly. He says, "We cannot propose any technical name, because the pathology of the affection is unknown; nor do we know whether the primary seat of mischief is in the retina or the choroid."

In the first volume of the Provincial Medical and Surgical Journal for 1842, at which time a sort of myotomic mania prevailed, will be found papers by Mr. J. Adams and Mr. E. A. Hocken, in which this complaint is called "*muscular amaurosis*," their opinion being, that the affection depends not at all upon any disturbance in the functions of the retina; but upon an overstrained or excessive action of the muscles of the globe, to the agency of which, in making a

lateral pressure upon it, thereby lengthening its antero-posterior diameter, they attribute the power of adaptation of the eye to near objects, and to the division of which, (the inferior oblique being the one generally selected,) they look for the relief of this complaint.

Of American writers, Dr. Littell, of Philadelphia, in a chapter entitled, "*Photophobia*," (p. 234,) says, "it is seated in the ophthalmic branches of the fifth nerve, and consists more particularly in an exaltation of the functions of those filaments from the lenticular ganglion which are distributed to the retina, and endow that membrane with sensibility to the influence of light;" and in a subsequent enumeration of symptoms incident to it, he seems to contemplate what we call *morbid sensibility of the retina*, speaking of it as a form of neuralgia wholly unconnected with inflammation.

The term *morbid sensibility of the retina* is met with in volume xxxv. of the Boston Medical and Surgical Journal, as the heading of a series of articles by Dr. Bethune, of Boston, by whom it is treated of as a form of amaurosis.

In France the popular designation is, as in England, "*affaiblissement de la vue*," and in Germany also "*Schwachsichtigkeit*," weakness of sight, and this term is applied to it by some professional writers of France and Germany,

while by others it is mentioned under different names.

Wenzel * calls it "*lassitude oculaire;*" Réveillé Parise † terms it "*une grande sensibilité des yeux*," and seems to refer it primarily to the retina.

M. Bonnet and M. Petrequin, in the Annales d'Oculistique, (vol. v. p. 250; vol. vi. p. 72,) have taken the same view of it with Messrs. Adams and Hocken, attributing it to the external motor apparatus of the globe, and recommending for the cure of it the division of these muscles; their observations being chiefly derived from subjects affected with strabismus, and the names proposed by them being *ophthalmokopie* and *kopiopie*. M. Sichel looks upon it as a form of *neuralgia*, and will in another connection be referred to. M. Desmarres ‡ devotes to it more space than any previous writer, giving to it the name of *Congestion de la Rétine*. He considers it to be the lowest form of chronic retinitis, and says it is always complicated with some degree of congestion of the choroid, ("congestion choroido-rétinienne.")

In the diffuse treatises of German writers, it is not mentioned at all, or very briefly.

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* Manuel de l'Oculiste, tome i. p. 7.

† Hygiene oculaire.

‡ Maladies des yeux, p. 688. Paris, 1847.

Jüngken* recognises two forms of idiopathic weakness of sight, idiopathischer Gesichtsschwäche; one arising from disease of the eyes, "*Hebetudo visus ex anopsia*, die Gesichtsschwäche aus mangel an uebung der sehkraft;" the other, which is the disease in question, he calls "*Hyperopsia* or *Hebitudo visus ex abusa oculorum;*" and he understands both as being affections of the retina or optic nerve, and amaurotic in character.

Himly† and Walther‡ both look upon it as the slightest degree of actual amaurosis.

On the other hand, Chelius,§ in his late work alludes to it as a condition of the eye not to be confounded with amaurosis. This disease or condition he terms Gesichtsschwäche, *simple weakness of sight*, and that from which it is to be distinguished, amaurotische Gesichtsschwäche, *amaurotic weakness of sight;* the first being "a condition in which the person sees with perfect distinctness, but is incapable of applying and making long continued exertion with the eyes;"

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* Lehre von den Augenkrankheiten, p. 576.

† Krankheiten des menschlichen Anges, p. 400.

‡ Die Lehre von schwarzen Staar und seiner Heilart in v. Graefe und v. Walthers. Journ. for 1840.

§ Handbuch der Augenheilkunde, b. vi. p. 290. Stuttgart, 1843.

the second being "a disease in which the faculty of seeing is itself more or less impaired, so that the patient can distinguish only near, and therefore for the most part only small objects, and those but imperfectly." But while he asserts a specific difference between it and amaurosis, he says nothing as to the pathological conditions of Gesichtsschwäche, *simple weakness of sight, morbid sensibility of the retina.*

Where then is the seat of this disease, to which, in this country, the name of "*morbid sensibility of the retina*" has been given? That it is not, as this name implies, primarily an affection of the retina, has been already intimated, if not proved, when speaking, among other diseases with which it is liable to be confounded, of the circumstances by which it is distinguished from slight or incipient amaurosis. But there are some other considerations tending to strengthen this proposition.

Affections of the retina seldom remain for any great length of time stationary. A person attacked with amaurosis either recovers vision rapidly, or, if slowly, with a progress which is appreciable from month to month. In this disease on the contrary, the affection of vision does remain stationary; the absolute imperfection of vision which follows the over-use of the eyes, being the same five or ten years after the

commencement of the disease, as when it was first observed. Dr. J. C. A. Franz says, (p. 202,) "although perfect amaurosis is almost always preceded by amblyopy, and the latter by weakness of sight, it may, for the satisfaction of all persons who suffer under weakness of sight, be confidently affirmed; and daily experience proves the truth of the assertion, that the weakness of sight in general remains stationary at the point which it has reached, if strict attention is paid to the general health," &c. Nor would the intolerance of light which occurs in aggravated cases of this complaint, if it were, as it is not, one of the early symptoms, indicate the retina as the seat of it. Intolerance of light characterizes the earliest stages of various other diseases, as corneitis, iritis, &c., in which the retina is not supposed to be primarily affected. In the extreme photophobia attendant upon strumous ophthalmia, no anatomical proofs of affection of the retina have ever been announced, and in a recent number of the Medico-Chirurgical Review it is accounted for by the laying bare of the sentient extremities of nerves which have been traced into the cornea. Mr. Middlemore says, (vol. i. p. 243,) "I have examined the eyes of children who have died from the supervention of acute disease upon an attack of strumous ophthalmia, which had not been beneficially influenced through a long

course of treatment, but which had, as is almost always the case, been relieved, though not entirely removed by the new disease, so that the patient's vision was much improved prior to dissolution by the diminished susceptibility of the retina; but in no instance have I detected any scrofulous degeneration of the retina, or any alteration which justified a supposition that it had undergone any organic change." After a series of reports of the treatment of strumous ophthalmia, into which the application of belladonna and nit. argenti entered with apparent benefit, Mr. J. France arrives at the conclusion, "that strumous intolerance of light is identified with morbid irritability of the conjunctiva, and not with irritability of the retina, and of consequence that the fifth, not the second nerve or its expansion, is at fault, seeing that when anæsthesia was perfect, photophobia was entirely absent; but on the relief of the former, the latter immediately supervened, notwithstanding that inflammation had meanwhile been mitigated." (Guy's Hospital Reports, 1847, p. 35, and Braithwaite's Retrospect, part xvi.) And if in the intolerance of light of strumous ophthalmia, the fifth and not the second nerve or its expansion is at fault, why may not the intolerance of light of other diseases be referable to other textures than the retina, provided that these textures are exposed

to the influence of light, and are endued with sensibility by the fifth or ophthalmic nerve? The referring of this symptom in all cases to some affection of the retina, either structural or functional, is only an assumption.

Affections of the retina are for the most part amenable to treatment; *morbid sensibility of the retina* is not. Amauroses, sthenic and asthenic, very often yield to appropriate treatment in the course of a few months or days. Morbid sensibility of the retina when established, does not yield to the most energetic and judicious treatment. The symptoms may be palliated, the suffering incident to it alleviated, and its duration probably abridged, but it is not curable by treatment in the sense in which amaurosis is so.

Lastly, the pain deep seated in the orbit which often characterizes this complaint, does not necessarily imply that the seat of the complaint is there also. Examples of disease located in one part, and the pain resulting from it in another, are too frequent to require a formal citation. Still less does it imply that the pain exists in, or is dependent on an affection of the retina, or optic nerve, it being generally admitted that the functions of the retina and optic nerve are restricted to the sense of vision, and that these parts are altogether or nearly destitute of ordi-

nary sensibility.* And moreover the ophthalmic ganglion with which all the nerves supplying ordinary sensibility to the globe, more or less directly communicate, lies deep in the orbit, only two or three lines before the foramen opticum. The choroid also has been designated as the possible seat of this complaint. But diseases of this texture are very obscure, as far as they are known involve some grave and permanent affection of vision, and a disorganization of neighboring textures; the supposition does not account for the characteristic feature of this complaint; and probably no reason can be given why it should be located in the choroid rather than the retina, except the high degree of vascularity of the choroid.

Believing that morbid sensibility of the retina is an affection neither of the retina nor of the choroid, I would suggest, that it is an affection of the part or parts of the globe by which the eye is accommodated to vision at different distances; *of the adjusting apparatus of the eye;* and that the arguments in favor of this position, though few and simple, are as conclusive as any reasoning upon questions of anatomy and physiology, which do not admit of demonstration, can be.

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* Lawrence, p. 85. Magendie sur l'insensibilité de la rétiné de l'homme, t. v. p. 37. Dictionnaire de Médicine, vol. xxi. p. 338.

In the first place, the eye requires, and does possess of itself a mechanism by which it is fitted to see with clearness objects at different distances. Upon this point writers are very generally agreed, though great diversity of opinion exists as to what constitutes the adjusting apparatus. It has, however, by at least one respectable authority, been doubted whether any mechanism for this purpose is required, and whether the agency of the mind alone in concentrating the attention is not sufficient to explain it, without any especial optical contrivance. But it must have been forgotten by him, that under the influence of certain drugs the power of varying the visual distance is almost entirely lost, while the mind is as capable of volition or attention as ever; and also, that in looking suddenly from one object to another at a distance from it, we are *sensibly* assured that the condition of the eye is in some way changed; that this assurance is the more *sensible* the greater the distance between the objects, and the oftener the experiment is repeated.

Secondly, this apparatus is, in common with all other parts of the eye, liable to disorder or disease, and capable of recovering from it. Such is generally admitted to be that condition of the eye in which it has lost the capacity of seeing near objects with clearness, a circumstance which

is quite inexplicable upon any other supposition than a change in the conformation, or derangement of the refractive media anterior to the retina. Myopy is also by most writers believed to be a disorder of the adjusting apparatus of the eye, some cases excepted in which it is congenital; but this condition unquestionably is sometimes dependent upon a deficient or impaired energy in the retina or optic nerve, or their seat of action in the sensorium.

Not only may the adjusting apparatus be so disordered that a person shall be incapable of seeing objects very near or very remote, but it may so lose its action, that the person shall see neither very distant nor very near objects, while at a certain, but invariable distance, vision is clear. A case of this sort is adduced by Mackenzie, (page 666): — "Dr. Wells, when twenty years younger, was able with his left eye to bring to a focus on the retina, pencils of rays which flowed from every distance greater than seven inches from the cornea; but by the time he reached the age of fifty-five, his eyes had altered considerably with respect to their seeing near objects distinctly, and he had in consequence been obliged not only to use convex glasses, but to change them several times, for others of higher power. On carefully examining the state of his sight previously to the repetition of some

optical experiments, he found to his great surprise that the power of adapting his eyes to different distances was entirely gone; in other words, that he was obliged to regard all objects, whether near or remote, in the same refractive state of those organs. He found that he required not only a convex glass of six inches focus to enable him to bring to a point on the retina rays proceeding from an object seven inches from the eye, but likewise a convex glass of thirty-six inches focus to enable him to bring to a point parallel rays." *

The adjusting apparatus of the eye after being disturbed may resume its normal action; the disorder may be recovered from. Of this every one who has had opportunities of observation must have seen examples in the recovery of ordinary vision by persons who had become myopic, especially by those who had become so about the age of puberty, in whom any symptoms of congestion of the eyes or head were manifest, and who early resorted and perseveringly adhered to professional counsel.

Presbyopy is sometimes but very rarely recovered from, occurring as it does in most cases, after the restorative forces of the whole system are enfeebled, and depending, as is generally be-

* Philosophical Transactions, b. 101, p. 380.

lieved, partly upon a permanently diminished refraction of the transparent media, as well as upon a loss of adjusting power. I have met with only two instances of premature presbyopy, one of which was thought to be congenital, and one to have commenced in the eighth year, and neither of which recovered from the presbyopy. In the three following cases, the presbyopy was recovered from.

A very interesting case of sudden and temporary presbyopy in a young boy is quoted by Dr. Hays * from the record of Dr. James Hunter in the Edinburgh Medical and Surgical Journal, Jan. 1840. — "The subject of it was an intelligent boy nine and a half years of age, who had been three years at school, and was very fond of books. His sight began to fail about three weeks before Dr. H. saw him, and was so much impaired in the course of four days that he could no longer see to read ordinary type with the naked eye. He had never had inflammation, or other diseases of the eyes, nor received any local injury that could have caused this affection. His general health had always been good, and he never felt better than at the time when his sight gave way. Dr. H., upon the most minute examination, could detect no

* Hays' Lawrence, p. 565.

visible symptom of the disease. There was no vascularity of the tunics; the size and shape of the pupils, the motions of the iris, eyeball, and eyelids, were perfectly normal, and he felt no pain or uneasiness. He could see distant objects as well as ever, but near ones appeared very indistinct. With the assistance of his father's spectacles, which were fitted with glasses of nine and a half inches focal distance, he could read the smallest print.

"The patient was ordered an active dose of calomel and rhubarb, and afterwards an aperient of senna and salts, twice a week, a spare diet, active out-door exercise, to be kept from school, and not to be allowed to use spectacles. Exactly three weeks afterwards his sight began to improve, and in the course of two days was quite restored. The medicine had purged freely; no worms were discharged. The boy was afterwards able to read as well as ever without glasses."

A case is mentioned by Mr. Ware, of "a boy eight years of age, who suddenly became presbyopic. After the presbyopy had continued a fortnight, and different local applications had been used without producing any sensibly good effects, a cure was accomplished by the application of leeches to the temples, and the use of purgative medicines. Two sisters of this patient were similarly affected. The elder, twenty years

of age, had never been able to do fine work, and for three years had been greatly assisted by convex spectacles. The younger, a girl of fifteen, had been presbyopic for about a year, being obliged to use glasses whenever she read or worked with her needle. This patient in the course of six weeks, during which she totally abstained from the use of glasses, was completely relieved from the necessity of using them by the application of two leeches to each temple twice a week. The elder sister in the same space of time experienced much relief from similar treatment, but was still unable to do fine work without glasses, partly in consequence of the long continuance of the infirmity, and partly on account of her not having abstained from the use of her spectacles with equal steadiness." — *Philosophical Transactions*, 1813.

Mr. Tyrrell* also, in a chapter entitled "Loss of the Power of adapting the Eye to near and distant Objects," gives two cases, so remarkable and conclusive as to the existence of a special adjusting apparatus of the eye, its liability to disorder, and its capacity for recovery, that I shall quote them in full.

"A young gentleman aged fourteen, whilst at school, found his vision affected in both eyes so

* On Diseases of the Eye, vol. ii. p. 491.

that he could not read when the print was placed at the ordinary distance from the eyes, but he was obliged to place his book at an inconvenient distance to enable him to learn his lesson; by degrees this defect increased to such an extent, that he was incapable of reading or writing, though he could distinguish distant objects as well as ever. The medical gentleman who was requested to see and treat the case, tried the effects of leeches, blisters and purgatives, keeping the patient quiet, and allowing him a very moderate quantity of food; but finding no improvement after a few days, he brought the boy to London for my advice. He said that his distant vision was perfect, but I found that he could not make out a common octavo print, unless with the assistance of a convex glass of four or five inch focus, with which he could see very small and minute objects distinctly. I made several very careful examinations of the eyes, but could not detect the slightest organic or functional error; the aspect, the feel, the movements of the various parts and of the whole appeared perfect. The affection had existed about six weeks previously to my seeing the young gentleman.

"I recommended mild alterative medical treatment, occasional counter-irritation in the forehead by blisters, and a plain diet; and desired that the patient should be kept tranquil, and

that he should not attempt to exert the organs unless a favorable change occurred. No further unfavorable symptoms arose, and after a few weeks' continuance of the treatment I recommended, the boy began to perceive some improvement in vision. By slow degrees he recovered the power of distinguishing near and small objects; and within a period of three months from my first seeing him he had perfectly recovered. I had opportunity of knowing that no relapse occurred. The supposed cause of this defect was a severe blow from another boy in a fight at school. It had been received many days before the vision became disturbed, and in the interval the boy had been as well as usual, not suffering from headache, or giddiness, or any other disorder of head or eye."

The second case was very similar, except that it affected one eye only. "It occurred in a young gentleman, aged sixteen, who had received a blow on the forehead a few weeks before defect of vision was perceived. I found the pupil of the affected organ rather larger than that of the perfect eye; and the motions of the iris not quite so active as those of the other organ. The patient recovered gradually but perfectly under the same treatment as that adopted in the former case. I cannot determine in my own mind the immediate or proximate cause of this affection."

He then says: "These cases afford to me the clearest proof, that a change does occur in the healthy organ, by which the focus is altered, and the eye adapted to distinguish, accurately, near and distant objects."

And I would add, that they as clearly establish the fact, that the agents by which this change is effected, are susceptible of disease or injury, and capable of recovery.

By the common consent of writers, who recognise the existence of a special adjusting power of the eye, it is admitted that in looking at large and distant objects this power is inactive; that in looking at small and near objects it is in a state of positive action, and that the nearer and smaller the object looked at, the more energetic is the action of the adjusting power. It must also be admitted, although I do not find it so stated, that the looking intently at very distant objects, calls for a positive, though reversed action of the adjusting power — the sensation of straining after, and endeavor, is felt in the eye not less decidedly than when applying it to near objects — the power is itself augmented by the frequent exercise of it, as is the case with seamen, gunners, &c., who by practice acquire an unusually ready perception of distant objects. These classes of persons often become prematurely presbyopic; and I have once known this

straining of the sight for distant objects to be given as the supposed cause of a case of morbid sensibility of the retina, which however afterwards became complicated with amaurosis. That effort of this sort is not often productive of morbid sensibility of the retina, is probably owing to the infrequency of its exercise, even by those who oftenest have occasion for it. The time devoted by a seaman to the observation of distant objects, bears no comparison with that which a student gives to his books.

If now it be granted that a power of adjusting itself to different distances belongs to the eye itself, that the parts by which this adjustment is accomplished are liable to temporary disorder or disease, and that in the act of looking at near and small objects this power is called into positive action; the adaptation of the eye to large objects and ordinary distances being merely the relaxation or inaction of the power; there will be found in the origin, symptoms, and progress of the disease strong grounds for a belief that the seat of what we call *morbid sensibility of the retina* is where this adjusting power resides.

1st. The periods of life at which morbid sensibility of the retina usually commences, are coincident with those at which a change is most likely to occur in the focal distance of the eye, when the adjusting apparatus from morbid or

functional disturbances in itself causes a change in the focal distance, or when the focal distance, being from other causes permanently changed, the adjusting apparatus is called upon for new and extraordinary efforts; when, in short, people are most likely to become myopic or presbyopic.

Myopy has been attributed to, and may be dependent upon various causes. Any one, or all of the transparent media through which light is transmitted to the retina, may be too dense, and therefore too refractive. Secondly, there may be an excessive convexity of the cornea or crystalline lens. Thirdly, the antero-posterior diameter of the globe may be too long. Fourthly, the antero-posterior measurement not being excessive, the lens may be placed too near the cornea. Fifthly,* the sentient power of the retina may be deficient, and thereby a near approach to objects be indispensable. And lastly, it may be the result of habit; or in other words, excessive, frequent, and too long continued exercise of the adjusting power of the eye in a state of positive action, may convert into a permanent, what was originally an occasional condition; the mechanism of this power of adaptation acquiring a permanent rigidity because it is seldom suffered to

* Percy & Réveillé-Parise. Memoires de l'Academie Royale des Sciences.

relax, and the extent of its action being consequently limited.*

In the first four of these six conditions for near-sightedness, it is evident that no inordinate action of the adjusting power of the eye is required in viewing near objects, but on the contrary, less than in a normal state. The existence of near-sightedness however from these causes must be very rare, for from their nature, they can (with the exception only of the possible, but very improbable elongation of the antero-posterior diameter, by the action of the recti muscles,) hardly be supposed to be other than congenital states of the globe, whereas myopy is very rarely congenital.†

In myopy resulting from either of the two last named causes, the adjusting power is implicated directly or indirectly; directly, when a habit of close application is the cause; indirectly, when a deficient sentient power of the retina is the cause; in which last case, the object being required to be brought unusually near in order to make a sufficiently vivid impression

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* "I may mention that a near-sighted eye possesses the power of adaptation, though not to the same extent as a perfectly healthy and natural eye." — *Middlemore*, vol. ii. p. 211.

† Ware, Middlemore, Mackenzie, Lawrence, Tyrrell, &c.

upon the retina, the refractive power of the organ must be accommodated to this distance. The two are unquestionably the most common, and in the opinion of M. Réveillé-Parise,* they are the only causes of near sightedness.

Now, so frequently does myopy precede, that it may be considered to be one of the most effective predisposing conditions or causes of morbid sensibility of the retina. Of forty persons affected with the disease, nine had previously become myopic.†

Presbyopy is probably of itself a still more effective predisposing cause of morbid sensibility of the retina than myopy. The permanent refracting power of the transparent media being lessened by the flattening of the cornea, the adjusting apparatus is called upon in looking at near objects, not only temporarily to increase as formerly this refractive power, but also to compensate for what has been lost through the flattening of the cornea. According to the table, at the close of this paper, of forty persons affected with morbid sensibility, six were presbyopic. It might be expected from this supposed influence of presbyopy in promoting morbid sensibility of the retina, that this table should exhibit a larger proportion of presbyopic persons; but it is to be

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* Hygiene oculaire. † See the Table.

remembered that presbyopy ordinarily comes on at a period of life when other predisposing causes of morbid sensibility of the retina are not likely to co-operate with it; and also that the relief attainable by presbyopic persons from convex lenses, is, in this country at least, very generally understood, and that probably many are saved from, or, in an early period of the complaint relieved of morbid sensibility of the retina by resorting to the use of spectacles,* without any medical counsel or observation.

In the Medico-Chirurgical Review, Jan. 1847, are some remarks by M. Sichel strongly corroborative of this view of the agency of presbyopy in inducing morbid sensibility of the retina. He says, speaking of presbyopy and its consequences, that "among these consequences ocular neuralgia is of frequent occurrence; that it at first comes on only after long exertion of the eyes, but eventually takes place as soon as this is

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* According to Kepler, convex glasses assist the sight of presbyopic persons, by "so altering the directions of rays diverging from a near object, that they should afterwards fall upon the eye as if they had proceeded from a more remote one; and that concave glasses benefit the myopic by producing a contrary effect upon rays which diverge from a distant object;" a theory, to which, in the words of Mr. Lawrence, "no addition has been made by any succeeding author."

commenced. Any exertion whatever indeed, of the eye, induces pain, and this may occur when it is quite at rest, and the affection may become complicated with rheumatism or cerebro-ocular congestion. At an early stage, rest and appropriate glasses suffice for the treatment. Later, absolute rest is essential, opiates being given internally, or veratria applied to the brow, the complications being properly regarded. But all measures are useless unless first absolute rest, and then only the gradual use of the eye be observed. Both eyes are usually affected, and when this is not the case, we should examine them, and see whether the affection does not arise from their foci being unequal. In some instances it is induced by the use of strong glasses."

This complaint is evidently identical with the one which we are considering. One symptom only is wanting, or rather, but seldom seen, in this form of the complaint. It is photophobia, which in young subjects is a frequent accompaniment in various degrees, and in old ones is seldom but sometimes observed, and this because the eye, in common with the whole system, has a diminished nervous excitability, and also because, at an advanced period of life there is commonly a turbidity of the humors sufficient to

modify the intensity of the light which passes into the eye.

2d. Morbid sensibility of the retina is almost never met with, except in persons who have been accustomed to apply their eyes to very near or very distant objects, or who, in other words, have habitually kept the adjusting power of the eye in a state of positive action.

3d. The primary, the only essential, and in some cases, for a long time, the only actual symptom of morbid sensibility of the retina, is intolerance of use of the eyes, or rather of active exercise of their power of adaptation to different distances.

4th. Upon the access of morbid sensibility in persons, the adjusting power of whose eyes had been previously disordered, this disorder is increased; the myopic almost always become more rapidly myopic, and the presbyopic more rapidly presbyopic than before. Moreover, soon after the commencement of morbid sensibility, myopy often comes on in persons who were not previously myopic.*

5th. A condition absolutely indispensable to recovery from morbid sensibility of the retina, is repose of the eyes — abstinence, partial or entire, from the application of them to near objects — relaxation of their adjusting power.

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* See the Table.

6th. The temporary relief which many persons laboring under this complaint, and being neither myopic nor presbyopic, derive from slightly convex lenses, points to the adjusting apparatus of the eye as the seat of what we call morbid sensibility of the retina. The effect of these lenses is of course to increase slightly the refraction of rays tending towards the retina — "so altering the direction of rays diverging from a near object, that they should afterwards fall upon the eye as if they had proceeded from a more remote one;" and therefore to relieve partially the effort demanded of the adjusting power of the eye, to accomplish within itself the necessary amount of refraction. Of the same import is the fatigue which results during application of the eyes to near objects from unnecessarily wearing concave lenses, the effect of which is to cause the rays proceeding from any object, to assume a direction as if coming from a nearer object, and to oblige the eye to accommodate itself to a distance less than that intervening between itself and the object.

Lastly. The terms commonly used by patients in describing their sensation after applying the eyes too long under this complaint, indicate an affection of a motive power. The words *fatigued*, *wearied*, *tired*, *strained*, *sprained*, are in frequent requisition; and I not long since heard a profes-

sional friend say, that the sensation could in his own case be compared to nothing so aptly as to that of a dislocated joint. Professor Forbes, in advocating the theory of the adjustment of the eye to different distances by a hydrostatic compression of the crystalline lens through the action of the external muscles of the globe, says, "The effort to view near objects is accompanied, in most if not all persons, by a sensible *muscular* effort.* Dr. Wells says, "It is known to those who are conversant with facts relating to human vision, that the eye in its relaxed state is fitted for distant objects, and that the seeing near objects accurately is dependent upon *muscular* exertion.†

What is the adjusting apparatus of the eye? — By what means is it accommodated to distinct vision at different distances?

Although this question has been discussed by persons of great ability, it has never yet been conclusively answered.

The power of adaptation has been attributed, partly to the action of the iris; and partly to the separate or joint influence exerted upon the refractive media of the eye by the external muscles of the globe, by a muscular structure in the sub-

* Proceedings of the Royal Society of Edinburgh, 1844.
† Phil. Trans., vol. ci., p. 38.

stance of the crystalline lens itself, and thirdly by the ciliary system. The mode in which either of these three last agencies, or any of them combined, act upon the refractive media, has been variously explained.

To the action of the external muscles of the globe has been assigned the effect of lengthening by compression the antero-posterior diameter of the globe: to which it may be objected, *first*, that if they were to compress the globe sufficiently to alter its shape, on account of the distance from the cornea at which the fleshy contractile belly of these muscles commences, it is difficult to conceive why, by their simultaneous action, the antero-posterior should be increased, rather than the transverse diameter of the globe; *second*, that in some animals, whose habits necessitate an adaptation of the eye to various distances, the hardness of the sclerotic * precludes the possibility of a change in the form of the globe by the compression of its muscles; *third*, that after the division of two of the recti muscles, and also of the oblique muscles in cases of strabismus, the power of accommodating vision to different distances is not impaired, but on the contrary, often found gradually to increase; and

* It is cartilaginous in the sturgeon; bony in the sword-fish. — *Wallace.*

lastly, that after the removal of the crystalline lens from an eye, although the action of the external muscles is as before, the power of accommodating the eye to different distances is always somewhat, and in many cases very much lessened; the majority of those persons who have been successfully operated on for cataract, requiring for different distances lenses of different convexity.*

Another effect of the joint action of the external muscles of the globe has been said to be an increased convexity of the cornea, by which the

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* M. Maunoir of Geneva, who strenuonsly advocates this hypothesis of the adjusting agency of the external muscles, adduces in support of it the case of a gentleman, M. Geberel, who, having been operated on for cataract, recovered vision as perfect and convenient for all distances as he had ever enjoyed. In shooting with a rifle at a mark two hundred feet distant, he gained the prize; and with the same spectacles which he used for this purpose could read the finest print, and at any intermediate distance see with perfect clearness. M. Maunoir, therefore, considers that neither the position nor form of the lens require to be changed in accommodating the eye to distances. (Annales d'Oculistique, tome ix. p. 19.) It is easier however to suppose that in this particular case, the lens upon which in part the power of adaptation depends being lost, its agency was compensated for by an extraordinary activity in the iris, to which no one will deny an agency in this process, than to suppose that the general belief that persons who have lost the lens require different ones for different distances, is unfounded.

eye will be adapted to near objects. But this theory, though announced by Sir Everard Home and Mr. Ramsden, as the result of actual microscopic and micrometric observation, was soon, by the same process of observation, disproved by Dr. Young, whose correctness no subsequent observer has disputed.

A third explanation of the action of the exterternal muscles for this purpose, is that of Mr. Forbes of Edinburgh, that the form of the lens is changed by hydrostatic pressure, communicated to it through the surrounding humors. To this opinion many of the objections made to the other explanations apply, and it has been formally refuted by M. de Haldat, in the Gazette Médicale, May, 1845, as follows: "A l'aide d'un appareil particulier il a soumis un œil de mouton à une pression transmise par un liquide, et bien supérieure à celle que peuvent exercer les muscles oculaires. Cet œil avait été préalablement ouvert au centre de son hémisphère posterieur, et muni d'un verre de montre légèrement graissé pour suppleer à la rétine qui avait été enlevée. Quelle que fût la pression qu'on produisît à l'aide d'un piston, on n'observait nul changement dans la pureté de l'image ; d'où M. de Haldat conclut qu'une compression bien supérieur à celle que pourvaient exercer les muscles de l'œil, n'influe en rien sur la forme du cristallin."

In view of all these explanations, it may be objected that the external muscles, on account of their tenuity and the inconvenience of their insertions, are in the human eye inadequate to the effect supposed, and that in some animals, requiring an extensive adaptation of vision, they are still smaller relatively to the globe.

Another class of physiologists * account for adaptation of the eye to distances, by the agency of muscular fibres in the substance of the lens itself, increasing and diminishing its refractive power. But the fibres of the lens are homogeneous, and have no resemblance whatever to muscular fibres; their texture is more firm and dense in the centre of this body than near its circumference, where, for this purpose, they would need to be the most so; in aquatic animals the close interlacing of these fibres by a sort of tooth work † precludes the possibility of a movement of one layer over another; and it has been demonstrated that in the mammalia the fibres themselves are tubular, ‡ while it has also been asserted that neither fibres nor lamellæ § exist in the lens, and that its structure is wholly cel-

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* J. Hunter, Dr. Young, Duges, &c.

† Sir D. Brewster.

‡ Dr. Arnold.

§ Soemmerring.

lular.* According to M. Bérard, † "Nothing muscular is demonstrable in the lens, and he who looks for anatomical truth and certainty, should keep out of sight theories which modify textures to suit their own exigencies."

The fourth agency to which the power of adaptation has been assigned, is that of the ciliary processes, or rather the *ciliary system;* in favor of which the names of many able physiologists ‡ may be cited, and of which it may be said that if it has not been positively proved, it has certainly never been disproved. By the ciliary system, I understand the ciliary ligament, (ligamentum sclerotico-choroidale,) the ciliary processes which arise from it, and the zonula ciliaris (orbiculus ciliaris, strahlenblätchen, &c.,) which serves as the membranous attachment between the ciliary processes, and the capsule of the crystalline lens. The modes in which this agency may be applied are two: either by the action of the ciliary system the circumference of the lens, or the anterior portion of the vitreous humor may be so pressed upon as to increase their refraction; § or by the action of the ciliary pro-

* Morgagni.

† Dictionnaire de Médicine, vol. xxi. p. 311.

‡ Kepler, Boerhaave, Porterfield, Knox, Heerman, Wallace, Hays, &c.

§ Travers, p. 62.

cesses chiefly the position of the lens may be changed; the latter being from the anatomical arrangement of the parts, and the analogy of artificial optical instruments, the most probable, and the one most frequently advocated. How the ciliary system acts to effect this change, has not been decisively shown, and on this subject it has been very judiciously remarked by Dr. Hays,* that "a careful examination of the hypotheses that have been offered to explain the adjustment of the eye to distances, leads to the inference, that it is effected by a change of position of the lens, and that the ciliary body is the motor power, but how it acts we are unable to explain."

The objections above stated to the other hypotheses, afford a strong negative argument that the ciliary system is largely concerned in the process of adjustment. Most of the direct arguments in favor of it, drawn from investigations in pathology and in human and comparative anatomy and physiology and also several ingenious explanations of the modus operandi, have been so recently and elaborately discussed, that they need not be repeated here. †

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* American Journal of Medical Science, vol. xxv. p. 173.

† Zur Physiologie der Ciliarfortsätze von Dr. G. Heerman. Von Ammons Zeitschrift, 1837, p. 341. A Treatise

There are, however, a few considerations tending more or less to strengthen this hypothesis of a change of position of the lens, which I do not remember to have met with in any work.

When the adjusting apparatus, from excessive action, has become fatigued, unable to meet the demands made upon it, the temporary disturbance of vision which takes place is quite analogous to that which results from forcing a fresh normal eye to read through a lens, or from attempting to use a lens adapted to an anormal condition of the eye at an inconvenient distance from it.

The fact that looking at any near object with the face turned upward, as may be the case when reading in a recumbent posture, is more speedily than when in any other position, followed by the sensation of muscular fatigue, is more satisfactorily accounted for by this than by any other theory. The lens of an eye looking upwards at a near object is not merely to be drawn, or pushed forward, but must be lifted up in order to bring it nearer to the cornea, and an extraordinary effort is required of the motive power to antagonize the gravitating tendency of the lens,

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on the Eye, containing discoveries of the Causes of far and near-sightedness, &c., by W. Clay Wallace, 1839, New York.

and also perhaps of the anterior portion of the vitreous humor.

It is observable also, that when a person whose crystalline lenses have been removed, uses but one pair of spectacles, he accommodates them to the vision of near objects by setting them upon the nose a little farther from the eyes.

But perhaps the most conclusive evidence of the great influence which the ciliary system has in the adjustment of the eye to distances, is derivable from the effect of narcotic, dilating drugs upon a sound eye. Under their influence, not only does the eye become presbyopic, its focal distance elongated, but it is for the time unalterably so, without some artificial aid.

I dropped, a month ago, an infusion of belladonna into my right eye, the focal distance of both for ordinary print varying from four to thirty-two inches. As soon as the pupil was dilated, common print became quite indistinguishable at any distance; but at the distance of five feet nine inches, I could read the heading of an advertisement in a newspaper. Nearer I could not read it at all, and with great difficulty two inches farther off. I then covered the eye with a half of a hollow sphere of wood, intended to aid in rectifying a strabismal eye, and which being blackened within, and having a central aperture of about the size of my pupil under

ordinary circumstances, might be supposed to compensate nearly for the effect of the belladonna, so far as its effect upon the pupil was concerned. With this contrivance, the heading of the same advertisement was legible at the distance of four feet six inches, while at the same distance I could read print a little smaller; but a very sensible obscuration took place if the paper was moved an inch nearer to, or two inches farther from the eye. I have since attempted to ascertain if these results are generally the same, in applying belladonna to the eyes of a person who has cataract complete in the left eye, and partial in the right eye. With the right, the pupils being fully dilated, he could read the heading of a paper at the distance of ten inches distinctly, and a variation of the distance for two inches either way rendered it less distinct. Upon placing the hollow hemisphere before the eye, the opacity of the lens being greatest in the centre correspondent to the wooden pupil, vision was too imperfect to determine what change had taken place in the focal distance or adaptation of the eye.

From this experiment as it resulted upon my own eye, it appears that the iris is concerned in the adjustment of the eye to distances, and that some other agency is still more largely concerned in this adjustment. These facts have been other-

wise demonstrated,* and are admitted by many writers; but this experiment proves also that the agent upon which, in common with the iris, the power of adjustment depends, has an action consentaneous with that of the iris, and subject to be suspended or paralyzed by the same means which produce a suspension or paralysis of the action of the iris.

What is this agent which yields with the iris to the influence of belladonna, stramonium, hyosciamus, &c.? It is certainly not the external

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* Sir D. Brewster made the following experiment. He took a piece of paper and wrote upon it the three words, "*on the eye.*" Having placed a fold of white paper behind the word *the*, and two folds behind the word *eye*, he fixed the piece of paper at one end of a square draw tube, and placed his eye at the other end, so that he could read all the words by the transmitted light of a candle held behind the paper. The word *on* was most luminous; the word *the* was less luminous; and the word *eye* was still less so. He now brought the paper as near the eye as he could without interfering with the perfect distinctness of the word *on*. When this was done, no exertion whatever could enable him to distinguish the word *the*, and still less the word *eye*. He then looked at them through a small aperture, but the indistinctness of the two last words was increased. When he made the words *the* and *eye* as luminous as the word *on*, or when he brought another candle near the eye so as to force the pupil to contract still further, then they could be seen distinctly." — *Sir D. Brewster, as quoted by Dr. W. C. Wallace.*

muscular apparatus of the globe, for the power of moving the eye in every direction is unimpaired.

It is not probable that it is the fibres of the crystalline lens itself, for they are not known to possess any capacity for motion; nor is any nervous or muscular communication traceable between the lenticular system and any other part of the eye.

It is probable that the ciliary system is this agent, because the ciliary ligament is contiguous to the outer rim or base of the iris; because the ciliary processes are known to be capable of motion; * and because the vascular and nervous communication and correspondence of these parts is demonstrated to be of the most complex and intimate character.

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* The opinion has been entertained that the ciliary ligament itself has a contractile power. (See an article in v. Ammon's Zeitschrift für die Opthalmologie, Ueber das Strahlenband im Auge, von Dr. Buckhard Ebli. b. 2, p. 160.) Ruysch says: "Ligamentun ciliare ex fibris moticibus constare nemo dubitabit." (Responsum in epistolam anatomicum de oculorum tunicis, p. 12.) But subsequently in his Thesaurus Anatomicus writes, after dissecting the eye of an ox: "Enim vero comperi ligamentum ciliare neutiquam esse considerandum tanquam musculum, ad pupillæ et humoris crystallini motum destinatum, totumque hoc negotium perfici a processu ciliari, ut a circulo musculari posterio in confinio pupillæ sito." No. xv. p. 8.

The ciliary processes are (the iris excepted) the only texture within the globe possessed of motive power, and for what purpose do they possess this power, if not to modify in some way by their action the refractive condition of the vitreous humor or crystalline system, to which through the intervention of the zonula ciliaris they are connected.* The only other purposes which they can subserve, are the cutting off rays of light which might pass into the eye around the crystalline lens, and the maintenance of the lens and vitreous humor in situ, purposes which would be as fully accomplished by a texture which had not, as by one which has a motive power.

In ascribing to the ciliary system the chief, and to the iris an important agency in the adaptation of the eye to distances, it should not be overlooked, that, when vision is exercised with both eyes, the external muscular apparatus must also be concerned to some extent in their adaptation to distances; inasmuch as the nearer the point of view to which both eyes are directed, the less do their axes approach to parallelism; the angle which they form in meeting being

* Most of the ciliary processes are so connected, but not all of them in all persons. Some of them are occasionally found to have no attachment to the lens.

necessarily more or less acute, as the object of vision is farther from or nearer to the eye. This influence of their external muscles in adapting the eyes to distances, by varying their convergence, is very fully and ably discussed in the article "Vue," of the Dictionnaire de Médecine, vol. xxx. but it does not seem to be of great importance. Print, which with one eye alone I can read at distances varying from five to twenty-five inches, becomes legible with both only one inch nearer to the eyes, and about seven inches farther off.

Is not the power of adaptation of the eyes to distances then, the result of the joint action of their external muscular appendages, and of the movable textures within the globe, the iris and ciliary system? Mr. Travers (p. 188) says: "Many phenomena of impaired adjustment correspond to the degree of mobility of the iris; for in some persons it is quick to contract, but unable to preserve its contraction, and falls open or fluctuates in the same quantity of light; and I have observed that the point of clear vision shifts accordingly." In the section on the physiology of the eye, (p. 65,) after enumerating the different hypotheses upon which the adjustment may be accounted for, such as a change in the figure of the cornea, a variation in the diameter of the pupil, a change in the figure of the globe

by the action of its muscles, a change in the figure of the lens by an action proper to itself, a change of place of the lens by the contraction of the ciliary processes, and the compression of the vitreous humor at its circumference, he adopts a theory ascribing it to "the joint action of the ciliary processes and the iris."

That the movements of the iris, though not voluntary* in the strict sense of the word, are controllable at will by changing the point of view, is evident to any observer; that its movements in obedience to the changes of light take place in consequence of an impression upon the retina,† is proved by the experiments of Fontana, and some observations detailed at great length by Dr. Schur in Die Archives für Physiologische Heilkunde, 1847, seem to prove that it has also an action in common with the levator and orbicularis muscles of the lids, and the recti and oblique muscles of the globe. I have condensed the case related by Dr. Schur as follows: A person completely amaurotic and paralyzed, recovered with the use of some muscles, also under

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* By some few persons an actual, voluntary control of the movements of the iris is possessed. See letter of Roget to Travers, p. 72 of Travers on the Eye.

† Not necessarily a visual impression, for in some cases of total blindness the pupil obeys the changes of light.

certain circumstances, the movement of the iris. His vision was not in any degree restored, but he recovered the movement of the orbicularis and of the recti muscles. The movement of the iris was not induced by the impression of light, nor was it induced by any irritation applied to the conjunctiva, the schneiderian membrane, or the puncta; but the pupil, whose diameter under these excitements never varied, changed its dimensions whenever the patient moved either the lids or the globe, and it was when the person made the most violent efforts to move either the lids or the globe, that the pupil contracted or dilated most energetically. Of this Dr. Schur satisfied himself by placing his fingers on the lids in order to keep them open; and from his experiments upon the case, deduces the following conclusions:

1st. "The innervation of the levator muscle of the lid, causes an action of the circular fibres of the iris, near the pupillary margin."

2d. "The innervation of the orbicularis muscle induces an action in the radiating fibres of the iris, which arise from its ciliary margin."

3d. "The contraction of the recti and oblique muscles of the globe, induces a movement of the fibres of the iris both circular and radiating, but they are feeble and less determinate."

All of these parts, it will be observed, together

with the ciliary system, receive nervous filaments either from the ophthalmic branch of the fifth pair, or from the lenticular ganglion, or both.

Dr. James Hunter, in remarking upon a case of premature presbyopy says: "When the eye is turned from a distant object to the contemplation of a near one, a short interval elapses before the latter is seen distinctly; this interval being occupied in the adjustment of the focus of vision. During this process, the only visible change is a slight contraction of the pupil; but all physiologists agree that some other change must take place. The lens must either become more convex, or move forwards, or the antero-posterior diameter of the eyeball be lengthened, or the cornea become more prominent; or *perhaps there is a combination of all, or of some of these modes of adjustment.* As all of the above actions imply a power of contraction and relaxation in certain internal structures of the eyeball, it is very probable that the movements of these parts should at times be subject to derangement from spasms or from over relaxation, in the same way as other organs endowed with a contractile power." (Edinburgh Medical and Surgical Journal, January, 1840.)

It is also as probable that parts having a consentaneous action, and subject simultaneously to disturbances of their motive powers, should be

simultaneously liable to other diseases incident to vital textures.

The great variety and diversity of the symptoms accompanying *morbid sensibility of the retina*, is occasionally in some degree explicable in looking upon it as an affection of the whole adjusting apparatus of the eye, which is partly within and partly without the globe, and of which any one portion may be more or less affected in different cases. A supra-orbital pain being the prominent symptom, the iris might from the analogy of inflammatory diseases of this membrane, be supposed to be especially affected; and if the pain most complained of is felt upon moving the eyes voluntarily, the recti muscles might be supposed to be especially affected. I have recently seen a lady, who after fatiguing the eyes by over-use, if she closes them, or can otherwise keep them perfectly still, suffers only a sort of superficial smarting; but upon any voluntary motion of the globes, particularly if it be a sudden motion, experiences a decided and violent pain.

The ciliary system being chiefly, though not exclusively, the means by which the eye is adjusted to distances, this part of the eye may be considered to be in most cases the especial location of the complaint which we call *morbid sensibility of the retina;* and there are some cir-

cumstances, independently of the agency of the ciliary system in the adjustment of the eye, which favor this opinion.

When the globe of the eye, in morbid sensibility of the retina is said to be tender upon pressure, it will usually be found that the tenderness is greatest in pressing towards the globe just below the middle of the eyebrow; a spot which of course, when the eyes are closed, corresponds very nearly to the cornea and its adjacent textures.

When in morbid sensibility of the retina the globe becomes visibly injected, the injection will be deepest immediately around the cornea, in a zone corresponding to the position of the ciliary ligament.

Moreover, the ciliary system, from its contiguity to and connections with almost every other texture of the eye, cannot but exercise an important influence in its economy. Mr. Lawrence says: * "The connection to which I have just adverted, is an important part of the anatomy of the eye, because it will be seen that at one and the same point the sclerotic and cornea are united externally, and the choroid and iris internally; while at the same part the choroid adheres internally to the vitreous humor by means of the

* On the Anatomy of the Eyeball. Hays' Lawrence, p. 61.

ciliary processes, the ciliary portion of the retina being included in the same adhesion. Further, the *zonula ciliaris* to which these processes adhere, is closely connected to the capsule of the lens. We may therefore consider this as a common point of union, embracing all the essential constituents of the globe, namely, the sclerotica, cornea, choroid, iris, retina, vitreous humor, and cyrstalline lens. It is a most important part in a pathological point of view; for example, in inflammation of the iris or cornea, peculiar appearances arise in the sclerotic, and the affection easily extends from the iris to the ciliary ligament and processes, and thus reaches the posterior and inner parts of the globe; while inflammatory affections beginning in the latter, may extend in the same manner to the anterior portion of the globe."

And from the peculiar abundance of fibrous filaments traceable into the ciliary ligament, as well as from its position, it may reasonably be concluded that the ciliary system is the centre of the ordinary nervous sensibility of the eye. So remarkably numerous and so closely intermixed are the filaments of the ciliary nerves in the ciliary ligament, that it has been thought by some to be a nervous ganglion. Sömmering,*

* "Nervi ciliares brevi ante annulum gangliformem in

Weber, and Lieutaud* believed this to be demonstrable, and the two last maintained, that the ciliary processes were bundles of nervous filaments.† Later anatomists do not accord with this opinion, but as far as the ciliary ligament is concerned, admit that it is largely supplied with nerves. M. Bérard says: "Sa nature est encore douteuse. Les uns l'ont consideré comme un ligament, et d'autres comme formé de vaisseaux. Ce qu'il y a de certain c'est que les nerfs ciliares y aboutissent, et paraissent s'y terminer." Dictionnaire de Médecine, vol. xxi. p. 299.

Assuming then that this disease, which we call *morbid sensibility of the retina*, belongs to the adjusting apparatus, and that it is located primarily and chiefly in the ciliary system, what is its nature? The reply to this must be conjectural, so long as the mode in which the ciliary system acts to effect the adjustment of the eye to dis-

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ramulos divisi, quorum surculi propagines et filamenta in isto annulo eâdem ratione disperguntur, quâ quintus nervus cerebri per suum Ganglion. Huic ista choroideæ annulus pro ganglio habendus, quippe e nervis ciliaribus, vasisque his intermixtis sanguiferis conflatur." Icones oculi humani, p. 64, v. Ammon's Zeitschrift, b. 2, p. 161.

* Plexus ciliare. † Renflement nerveux.

tances, is unknown. It is very reasonably supposed, that as the ciliary processes are proved to be capable of motion, it is effected directly through their agency. But we do not know how this agency is applied, or in what it consists; whether their motion is derived from a muscular or erectile texture. Boerhaave, Platner, Santorini, Porterfield, and Knox assert that the ciliary processes are muscles; Ruysch, Zinn, Sömmerring, Arnold, M. Ribes, and Mr. Lawrence, that they consist wholly of a vascular tissue; Sir Everard Home and M. Bauer, Morgagni, Dr. Wallace, &c., that they are partly muscular. Similar differences of opinion have existed also as to the action of the iris. Sir Everard Home and M. Maunoir claim to have demonstrated the muscularity of the iris. Mr. Travers and others admit it, while on the other hand Dr. Arnold denies it, and some experiments of Dr. Fazio, and subsequently of Prof. Gremelli of Modena, go to prove that it is not a muscular but an erectile, tissue. By injections of oils in very young children, they satisfied themselves that the iris is composed of "a turgescible and erectile vascular tissue, in which arterial vessels predominate;" and that "in injecting the bodies of children, from being soft and much dilated, it became turgid and contracted more than half of its diameter." (Rev. Médicale, 1841.) Dr. Wallace

also appears to have satisfied himself by injection of the erectility of the ciliary processes, to which he believes the minute bundles of muscular fibres observed by himself and others to be subservient.*

These differences of opinion as regards the action of the iris, it has been attempted to reconcile, or rather to set aside by the suggestion, that it may move neither by its muscularity nor its erectility, but by some "special action," peculiar to itself, and of which no other portion of the system furnishes any example. To explain the action of the ciliary processes, this mode of solution is still more needed, and at least equally applicable.

Nor are these textures the only ones to which the power of motion belongs, while it cannot be fully accounted for as the result either of muscularity or erectility. Such are the puncta lachrymalia of the eye,† and the vibratory cilia of mucous membranes. ‡

Of the ciliary system, however, though we do not understand precisely what its motive power is, we do know that the ciliary ligament is pre-eminently endowed with nervous sensibility,§ and

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* Treatise on the Eye, 1839.

† "We do not exactly understand the mode in which the circular orifices of the lachrymal vessels suck up the fluid." Lawrence, Anat. of the Eye. Hays, p. 96.

‡ M. Donné.

§ *Sensibilité de l'œil.* La sclérotique et la cornée sont

that the ciliary processes are preëminently vascular. We also know, that in any texture possessing motive power, whether muscular or erectile, the positive exercise of this power requires or is accompanied by an increased fulness of the blood-vessels of the part; that excessive and long-continued distention of any organs, even with their appropriate stimulus, will in some cases produce pain, and in some a permanently augmented nervous sensibility; * that morbid sensibility of the retina dates most frequently from the age of puberty,† when with other changes an increased fulness or activity of the

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traversées presques sans douleur dans les opérations de cataracte, et il en est de même de l'iris que l'on peut déchirer presque à l'insu du malade; cependant certaines kératites et irites sont trés douloureuses, et peut etre les vives douleurs qui se montrent quelquefois immédiatement après l'abaissement tiennent elles à ce qu'un nerf ciliaire a été piqué par l'aiguille à cataracte. Suivant M. Magendie, la troisième, la quatrième, et la sixième paires de nerfs sont tout-à-fait insensibles aux excitans méchaniques. La rétine a été plusieurs fois piquée sans douleur, et le nerf optique, paraît, aussi, insensible comme les nerfs des sens: la sensibilité ne parait pas exister davantage dans les humeurs et autres parties de l'œil." — *Dictionnaire de Médecine*, vol. xxi. p. 338.

* Of this, some affections of the stomach, bladder, and other abdominal organs offer examples, and it is well known that the congestion caused by the prevention of the return of venous blood from a limb produces pain.

† See the Table.

whole vascular system takes place; that in the paroxysms* of this complaint, there is often what is popularly called a determination of blood to the head; that any circumstances which promote the general fulness of the blood-vessels of the head, tend also to aggravate the complaint; and that in the early stages of morbid sensibility of the retina, local depletion, and at all periods cold applications, give in most cases a temporary if not permanent relief.

It is impossible to attribute to this complaint an inflammatory character, because it exhibits none of the results which attend inflammations of other internal textures — results which could not fail to be observed from an inflammation of a part situated as this is with regard to the transparent media of the eye, and connected as it is with almost every membrane of the eye.

From these considerations I infer, that the first condition of morbid sensibility of the retina is a congestion of the blood-vessels of the ciliary processes, which being frequently repeated, occasions by the stimulus of distention an exaltation of the nervous sensibility of the whole ciliary

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* By paroxysms in morbid sensibility of the retina, I understand those periods of unusual sensitiveness or suffering, which come on sometimes spontaneously, but for the most part from some known provocation.

system, and through it of the eye, and that in its nature it is analogous to that nervous affection which has been recently described as NEURÆMIA.*

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* "In spinal irritation, the change is probably in the capillary circulation — first, of the cerebro-spinal axis; second, of the ganglia of the sympathetic, or ganglia of the posterior spinal nerves; and third, of the fibrils of the nerves themselves. This purely functional derangement of the nervous system has been termed Neuræmia by Dr. Laycock, one of the recent English writers on this subject before mentioned, and the class of diseases to which it gives origin, neuræmic." — *B. and F. Medical Review*, p. 98, January, 1845.

CAUSES.

Of the predisposing causes or circumstances which favor the production of this disease, the following are some of the most obvious.

Sex. Females are somewhat more liable to it than males, if the small number of cases forming the table at the close of this essay is deemed sufficient to establish it; of the forty, twenty-four, or three fifths, are females.

Age. One of the most striking, and in considering the pathology of this complaint, one of the most available facts, is this, that in a very large proportion of cases its commencement is referred to a time correspondent with, or following soon after, the period of puberty and decadence, the periods at which the adjusting powers of the eye are most liable to be impaired, occasioning in youth a shortening, and in old age a lengthening of the focal distance. In forty cases of morbid sensibility, its commencement was dated in one, the patient being prematurely presbyopic, and having applied her eyes without the aid of

glasses, as early as her fifth year; in twenty-two, it came on between the tenth and twentieth years; in seven, between the twentieth and thirtieth; in four, between the thirtieth and fortieth; in six, between the fortieth and sixtieth years. Among males more cases occur about the eighteenth year, and among females about the fifteenth year, than at any other time; and persons of either sex who have reached middle life without any intimations of it, are very unlikely to acquire it until they become presbyopic, and then chiefly from neglecting to make a seasonable resort to convex lenses.

Occupation has much to do with the production of morbid sensibility of the retina, even independently of the use of the eyes involved in it. Sempstresses, watchmakers, engravers, printers, book-keepers, artists, students, and all others whose occupations are sedentary and within doors, are especially liable to it.

Recent diseases, and more particularly those which are attended with great loss of muscular strength, predispose the eyes to this complaint. During the convalescence from severe illness, and before the system has recovered strength, an invalid very naturally resorts to reading for amusement, and to this circumstance the origin of morbid sensibility of the retina is often attributable. No disease is more frequently alluded to

on this account than typhoid fever, and of none is loss of muscular strength more characteristic.

Prostration of the system from other causes, such as chronic disease, hemorrhage, parturition, lactation, venereal excesses, watching, or too violent and protracted bodily labor also promote it.

A scrofulous habit very strongly predisposes to morbid sensibility of the retina, and in general the liability to it is greater in persons of delicate health and slight muscular power than in the robust and strong.

Disordered menstruation and other uterine diseases have a similar influence, and in some cases of morbid sensibility of the retina, the period of menstruation, though regular and healthful, is invariably marked by an increase in the frequency and severity of the pain and other symptoms affecting the eyes.

Persons subject to *headache*, or a congestion of the blood-vessels, commonly called a *determination of blood to the head*, are thereby disposed to this complaint.*

In two cases under my own observation, the disease has appeared to have a metastatic origin.

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* Hypertrophy of the heart, according to Desmarres, is a predisposing cause. Traité des Maladies des Yeux, p. 690. Paris, 1847.

Both were females, and had suffered for several years with spinal irritation. In one of them immediately, and in the other about three months after recovering from this affection, morbid sensibility of the retina commenced, and in one of them still continues. In her case pressure upon the upper dorsal vertebra causes pain in the left eye ; and extreme tenderness of the globes to pressure existed in both cases.

Color of the Iris. Eyes of which the iris is dark brown or hazel, are more susceptible of morbid sensibility of the retina than those of a lighter color, and if the excess of light over dark eyes in the people of this country is taken into account, this susceptibility is very marked. Among forty persons affected with this complaint, the iris was of a dark shade in twenty-three,* and the darker the iris, other things being equal, the greater is the susceptibility to it.

Uncommon largeness of the pupil has the same significance as a dark color of the iris. Though unable to refer to any recorded observation on this point, I state it from remembrance, and infer it also from the well known fact, that eyes having an uncommonly large pupil, are more likely than others to be or become myopic.

It is also observable, that many of those affect-

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* See the Table.

ed with morbid sensibility of the retina, present a pearly, rather than a yellowish or milky whiteness of the sclerotic; eyes of this tinge owing it in fact to the delicacy of the sclerotic and other external coats, and being rarely met with, except in persons who have some of the constitutional peculiarities just spoken of as showing a liability to this disease.

Both *myopy* and *presbyopy*, the occurrence or increase of which have been spoken of as among the symptoms or results of morbid sensibility of the retina, were at the same time stated to be its frequent precursors. They in fact, more decidedly than any other condition of the eye, predispose it to this disease. Of forty cases of morbid sensibility of the retina, nine had been myopic and six presbyopic;* and in advanced life I have never known it to occur to a person who was not either myopic or presbyopic.

Muscæ also, when considered as among the later symptoms of morbid sensibility of the retina, was said to be not uncommonly its antecedents. In six out of forty cases, the previous existence of muscæ was ascertained, and in others it is very probable that it would have been by more diligent inquiry on this point.

Most *inflammatory affections either of the eye or*

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* See the Table.

its appendages in early life, render the eye afterwards more susceptible of morbid sensibility of the retina. In sixteen out of forty cases the eye or its appendages had been formerly diseased. The diseases most frequently met with in tracing back the history of a case of morbid sensibility of the retina, are of a chronic, subacute character, or have been marked by frequent relapses, such as chronic ophthalmia of the globe, or lids, strumous ophthalmia, pustular, which is indeed only one form of strumous ophthalmia, granulations of the lids, and tinea ciliaris. Of these the most common is tinea ciliaris, which is also in a very mild form not unfrequently found as an accompaniment of morbid sensibility of the retina; and I have in some such cases had reason to believe that upon a spontaneous disappearance of the secretion at the roots of the lashes, the symptoms of morbid sensibility of the retina were aggravated, and again by its re-appearance mitigated. As a strumous or otherwise feeble state of the system disposes to both of these complaints, their coincidence is of course not extraordinary.

Excessive and ill regulated use and exposure of the eyes must be enumerated among these predisposing causes, as the most effective, but being also the direct and immediate causes of morbid sensibility of the retina, will be more conveniently treated of as such.

DIRECT CAUSES.

Excessive or too long continued use or application of the eyes to near objects, is a direct, and in very many cases the sole cause of morbid sensibility of the retina; of which disease, as has been previously shown, intolerance of use is the primary and essential, and in some cases for a time the only symptom. Precisely what constitutes excessive or too long continued use, it is impossible to say; the capacity for exertion of the eyes being as various in different individuals as their muscular strength. One person may be capable of reading or writing without inconvenience for ten, and another for not more than three out of twenty-four hours. This capacity varies also in the same individual at different periods, being greater in middle than in early or advanced life, and greater also in health than during sickness or convalescence. In drawing the line between moderate and excessive use, reference must necessarily be had to other circumstances hereafter to be considered, such as the size and distinctness of the objects looked at, the light in which they are seen, &c. For all practical purposes of precaution and prevention, it is sufficient to say, that any use of them which causes the slightest sensation of discomfort in

the eyes or elsewhere, is excessive, and directly promotive of morbid sensibility of the retina.

But though excessive use of the eyes cannot be absolutely measured, it is easy to point out various circumstances not always indeed avoidable, which render any given amount of use more fatiguing and injurious than it would otherwise be.

In the first place, application of the eyes is fatiguing in proportion to the *smallness of the objects looked at*, the adaptation of the eye to short distances requiring a positive, active exertion of its adjusting power, and the distances at which an object must be placed in order to obtain distinct sight of it, being shorter as the object is smaller. Independently of any theory as to the mode of adjustment, this fact is sensibly proved by the feeling of uneasiness in the eyes, often compared to muscular fatigue, which any person will experience who with perfectly healthy eyes tries to look steadfastly for a few minutes at an object so small that it can be seen only at the distance of two or three inches. Books therefore, in a small type, cannot be read with ease for so long a time as those which are in large type; persons who write a small hand are more likely to over-use their eyes than those who write in a large one; and people who do fine sewing than those who sew on coarse materials.

Uninterrupted application of the eyes is imprudent. In all occupations, for which close application of the eyes is required, the neglect to observe suitable intervals of repose very much enhances the fatigue incident to them. It is not unfrequently the continued fixedness of the eye, its unvarying adaptation and confinement to one distance, that wearies it more than the sum total of labor performed by it. Many people continue to read or sew until an uneasiness in the eyes causes them instinctively to look away, but this had better be done before receiving the hint. Such intervals of repose should be short and frequent, rather than long and infrequent. We frequently almost unconsciously change the position of the body and limbs even when at rest, in order to relax first one set of muscles and then another; and the effort whether muscular or not by which the focal distance of the eye is adapted to near objects, needs to be intermitted almost as often. Less harm in fact will result from the use of the eyes for ten hours, with a respite of ten minutes once in every hour, than from the uninterrupted use of them for four or five hours daily. By an interval of repose is not meant of course that the eyes should be closed, but that they should be directed to distant, if possible to agreeable objects, while at the same time the position is changed, and some moderate exercise is given

to the limbs. The celebrated Scotch painter Raeburn in his autobiography, says that he derived very great benefit and relief in severe and protracted labors with the brush, by occasionally stepping from his studio into a balcony which commanded an extensive and beautiful landscape.

A monotonous use of the eyes is more fatiguing than a varied use of them. For the student an occasional change from reading to writing, from one text to another, or at least from one subject to another is desirable. He should not continue for several days, or even for one day uninterruptedly, to look at precisely the same type. Sir Jonah Barrington, whose sight in early life was feeble, while writing at an advanced age, the amusing "Personal Sketches of his Own Time" says: "Now I can peruse the smallest print without any glasses, and can write a hand so minute, that I know several elderly gentlemen of my own decimal who cannot conquer it even with their reading glasses. For general use, I remark, that I have found my sight more confused by poring for a given length of time over one book, than in double the time when shifting from one print to another, and changing the place I sat in, and of course the quality of light and reflection; to a neglect of such precautions I attribute many of the weaknesses and near

visions so common with students." In mechanical occupations also, although this alleviation is not so often attainable, the operative who is engaged upon minute objects, should, especially if he is exposed to brilliant colors, or reflected light, occasionally vary the processes upon which he is engaged.

An unsuitable provision for, or exposure to light has often, both in connection with, and independently of the use of eye, much to do with the production of morbid sensibility of the retina. Light may be excessive or deficient in quantity, or of an unsuitable character; and, although the eye has within itself means of compensating to a great extent for these irregularities, it cannot altogether protect itself from sudden and violent changes. It cannot, for instance, wholly defend itself from the injurious effect of awaking in an apartment into which the sun, or even the full light of day is admitted, or of entering, from darkness, a brilliantly lighted room, or of being in one at the moment it is suddenly lighted, or from watching by night out of doors, or from a dark apartment vivid flashes of lightning, or the intensely vivid combustion from certain chemical processes. It is not always easy to guard the eye sufficiently from the continued excess of light, to which, in some shadeless, and at times snow-covered regions, it is exposed. Broad-brim-

med hats, deep bonnets, sun shades, and umbrellas for pedestrians, and soberly lined carriages with blinds at the windows for those who ride, will do much to mitigate it; while in extreme cases, as of long protracted exposure to sunlight, direct, or reflected from sand, water, or snow, especially if accompanied by dust or cold winds; or to intense artificial lights, such as are met with in glass factories, and forges, and foundries of metals; plain colored glasses are serviceable.

But, although it is necessary to guard the eye from the sudden and violent stimulus of light, it is equally important to obtain for the daily occupations of life *a sufficient supply of light*, and this is by no means attainable by all those who most need it. In large, and especially in commercial towns, where, for the convenience of trade and on account of the value of land, streets are narrow and buildings lofty, many counting-rooms, offices, and workshops are but feebly lighted at mid-day, and certainly visited by a premature twilight; and, notwithstanding that the eyes of the occupants become habituated to this imperfect illumination, and for a time experience from it no sensible inconvenience, it does directly promote morbid sensibility of the retina. Not only is the eye deprived of its appropriate and healthful stimulus, which it needs as the stomach requires food, or the lungs air, but the adjusting

power of the eye is called upon for an extraordinary effort, because an object viewed by an insufficient light must be brought nearer to the eye in proportion as the light is faint.

But besides being excessive or feeble, the light which falls upon a desk or work-table may in other respects be unfavorable. It should not enter the apartment with the sunshine, it should not be a directly reflected light, such as may be thrown from a wall upon which the sun shines, or from polished highly colored surfaces within the apartment; not a colored light, such as is transmitted through stained or painted glass; not an unsteady light, such as might be caused by the moving foliage of a tree, or a loose blind at the window, or by a reflection from water; but an uniform, diffused light, the general direction of which should not be from below, or horizontal with the eyes, but somewhat from above. The face ought not to be turned directly to or from the window, but placed obliquely, and in writing, with the left side toward it.

Use of the eyes by *artificial light*, is of course more fatiguing than by daylight, and all occupations requiring close attention of the eyes should be restricted to daylight; but during the winter of northern latitudes, this is for many classes of persons impossible, and the means of artificial illumination therefore demand a careful consideration.

The best artificial light is that which resembles most nearly the light of day. The first condition to be fulfilled, but one very rarely accomplished, is that it shall be abundant. Excessive it is hardly possible to render it, if, as has been estimated by M. Pictet, "one ray of the light of the sun has an intensity twelve thousand times greater than a ray of a common wax candle;" and taking into account those who in pent-up cities have during the day scarcely enough light for their daily labor, and the many every where who for economy work with a feeble lamp by night, it is probable that deficiency of light is a more productive cause of *morbid sensibility of the retina*, than its excess.

But, although the amount of artificial light may be perhaps never excessive, and often deficient, it is frequently offensive from its mal-arrangement. It is difficult to find an apartment provided for ordinary purposes with enough artificial light, but the little there is will be badly disposed. The light should not be concentrated upon one spot, presenting an alternation of light and darkness, but a diffused, uniform light throughout the apartment; that when the eye seeks to relieve itself by turning occasionally from the book or work to a more distant object, the iris may not be called into sudden and violent action, by the difference between the bril-

liantly lighted surface below, and the obscurity around. In a well lighted room, the light must be not only abundant and diffused, but the lights must be so placed that their direct rays shall not fall upon the eyes. For this purpose, they must necessarily be above the heads of the occupants, and the higher the better, if they are sufficiently numerous and bright. The best possible arrangement is a cluster of lights hanging from the ceiling; but this, the only unobjectionable mode of lighting for evening occupations, is by most families resorted to only on extraordinary occasions when they have no especial use to make of their eyes. If the height of the room will not admit of this, the light must at all events be elevated above the head of a person who sits, and besides the principal one upon the table, it is well to have another in some other part of the room, all within view being surrounded with some plain translucent shade. An opaque shade for a table lamp is quite inadmissible, as it must give a very limited illuminated space, contrasting strongly with the surrounding shadow. If the light is unavoidably placed below the level of the eyes, the best shade is a double one of thin silk or gauze; the inner layer being white, and the outer one green or dark. A porcelain shade is also agreeable. For lights which are high, the most economical, and at the same time a perfectly

effective shade, is a shallow cup of ground glass immediately below the blaze, the concavity of course looking upwards, the rim rising to a level with, or a little above the top of the blaze, and having a circumference of about twelve inches. A greater amount of light is thrown upward and diffused throughout the apartment than is possible through a spherical shade, while the eyes are protected from the direct rays of light. Attached to a light which can be looked down upon, it is of course worse than none, becoming in fact only a reflector. To lamps in common use no glass ornaments by which the light is decomposed, should be appended, and upon ground glass shades no cuttings should be made through which the flame can be seen. A reflector is very decidedly to be condemned as an appendage to any light within the ordinary range of vision, but may in some situations be used with advantage.

Of the materials for artificial light, those only are unobjectionable which give a *steady colorless light* without smoke. Wax, gas, and pure oils fulfil these conditions. Of these wax is said to be preferable. Gas is very much to be commended for the whiteness and intensity of its flame, but especially requires the intervention of a shade, and is to be objected to when, from some defect in the apparatus, it burns with a tremulous and fitful flame. Oils of the purest

quality only, can be made to burn free from color and smoke; and in using them attention must be paid to the construction and trimming of the lamp. In burning oil a very foolish expedient is often resorted to for an increase of light. A well trimmed wick is picked up, by which means a little more light is obtained, but in a degree by no means commensurate with the increased consumption of oil and the immense production of smoke. It is in every respect more economical to light another lamp.

Lastly, it must be confessed that the conditions here suggested as indispensable for application of the eyes at night with ease, cannot be reconciled with economy in the ordinary acceptation of the word.

For occupation by artificial light, the largest print and coarsest fabric, of colors approaching to white should be selected, and reading is to most people more fatiguing than writing by lamp-light. When no close application of the eyes is to be made, a moderate artificial light suffices, and for persons who have been tasking their eyes during the day, is preferable; but it should be colorless, steady, and not directly in view, or else screened by a shade.

An unnecessarily *close approximation of the book or work to the eyes* is well known to be promotive of myopy, and is therefore probably of

morbid sensibility of the retina. This is especially the case about the period of puberty, when, as a general rule, books and other objects of continued occupation should be placed at the greatest, rather than the least focal distance which admits of distinct vision. To attempt to apply the sight closely in walking or riding, or when the body is otherwise in motion, as for example, when rocking in a chair, is highly prejudicial and fatiguing, chiefly from the incessant change of action in the adjusting apparatus of the eye. Reading even in a railroad car should be avoided, unless the movement of the vehicle is remarkably smooth. When travelling rapidly, the eyes are soonest fatigued in looking at objects by the roadside, and should be turned to distant ones in preference. Looking steadily at objects in rapid motion is for the same reason fatiguing, and persons suffering from morbid sensibility often complain that their eyes much sooner become fatigued and troublesome when walking in a crowded street than in a quiet one.

The *position of the body* when using the eyes is of some import, and may indirectly and even directly promote *morbid* sensibility of the retina. It should not be a constrained or stooping position and should occasionally be changed. The desk should be, as usual, an inclined plane, and be so contrived that the inclination and height

can be varied at pleasure. The most objectionable position is a recumbent one, with the face turned upward, by reading in which the eyes become more speedily fatigued than in any other; a fact which is very easily explained upon the hypothesis which has been assumed as to the mode in which the eye is adjusted to different distances. The crystalline lens, to be carried forward by the ciliary processes towards the cornea, must be lifted up against the attraction of gravitation. And if in a partially recumbent posture we attempt to compensate for it by turning the eyes forcibly downward, fatigue is almost as soon induced by the unnatural effort required of the inferior recti muscles. A case of morbid sensibility of the retina in a young lady, is attributed by her medical attendant to the habit of amusing herself with reading while lying for some hours daily upon an inclined plane, on account of some curvature of the spine.

Use of the eyes may be *so timed* as to be unnecessarily fatiguing, and is so immediately after eating a hearty meal, or any violent effort, bodily or mental. The forenoon, both before and after breakfast, if the sleep of the preceding night has been sound and refreshing, is the best, and the hour immediately after dinner the worst time. Using the eyes at twilight, either in the morning or evening, is not to be thought of; and in

speaking of the morning as the best time for using the eyes, I would not be understood as recommending the student to commence reading or writing as soon as he rises, before he is fairly awake and his eyes accustomed to the light, and still less as advising him to resort to artificial light in the morning, rather than in the evening.

The *color of objects* to which the eyes are directed, may enhance the fatigue of using them. Black, and colors nearly approaching it, are fatiguing to persons sewing, from the indistinctness of the thread of the cloth, and certain very brilliant colors, as red, orange, and yellow, from their stimulating effect upon the eye. In some sorts of embroidery, and other ornamental work in silk and worsted, in which very gorgeous effects of color are intended to be produced, the predominant colors are often more offensive to the eyes than the smallness of the stitch.

Contrasts of coloring beyond what is required to insure distinctness of vision, are exciting to the sense of vision, and therefore enhance the fatigue of applying the eyes. Upon this ground, the extreme whiteness, fineness of texture, and in some cases polish of the paper now used for printing and writing is objectionable, as presenting a too violent contrast with the blackness of the letters. It is as refreshing as it is uncom-

mon to meet with a book to which time or the paper maker has imparted a dusky hue.

The abuse, or in other words *the unnecessary, the too early, or the too long continued wearing of concave lenses*, renders application of the eyes unnecessarily fatiguing, and tends very strongly to produce *morbid sensibility of the retina.* The slight myopy for which they are assumed by many young persons, and which by judicious management might pass away or become stationary, is perpetuated, probably increased, until, from being habitually worn in viewing distant objects, it is found that near ones also are rendered more distinct, they are resorted to for reading and sewing; the adjusting power of the eye is never allowed to relax from this high state of positive effort, until at last from this over-use, whether by constant congestion of its erectile tissue, or overstrained muscular action, the nerves of sensation with which this apparatus is furnished acquire that excessive and morbid sensitiveness which we call morbid sensibility of the retina. The following remarks by M. Réveillé-Parise, bear very decided testimony to the pernicious influence of concave lenses, although he considers near-sightedness as dependent in general upon a nervous weakness, or lower degree of sensibility of the retina, or optic nerve, and would probably make an analogous explanation of *mor-*

bid sensibility of the retina. He says (page 70):— "Les corps vus au moyen de ces verres, paraissaient *petits et brillants ;* leurs contours sont plus nets, plus tranchés, que dans l'état naturel ; or, il est de fait, que plus un objet est petit et eloigné, plus il fatigue l'organe que veut en apprécier les qualités, parceque cet objet n'envoyant à l'œil, qu'une petite quantité de rayons, nous oblige aussi à faire de plus grands efforts pour l'apercevoir distinctement. Ajoutons encore l'éclat et la vivacité de la lumière produite par la concavité du verre, et l'on sentira combien ces instruments sont pernicieux à la vue. Ils ne produisent réelement d'effet qu'en ébranlant et excitant fortement la rétine. Pour s'en convaincre davantage, il n'y a qu' à considérer ce q'eprouvent les yeux lorsque, placés dans un grand jour, on pose tout à coup devant eux des verres un peu forts: on verra alors la pupille se contracter d'une manière aussi vive que subite ; l'individu éprouvera comme un resserrement spasmodique dans l'orbite. L'expression populaire, *cela tire l'œil* exprime parfaitement ce qui a lieu dans ce cas. Les personnes qui font usage de besicles pendant plusieurs heures consécutives dans un lieu fort éclairé savent d'ailleurs qu'en les ôtant un instant, les yeux paraissaient tomber dans un état de stupeur et d'hébétude, si l'on peut parler ainsi. La salle paraît immédiatement plus ob-

scure, les objets ternes, et les yeux sont fatigués, abattus. Qui pourrait douter que cet effet ne soit dû au stimulus de la lumière sur la partie nerveuse de l'œil ? Pour moi, je compare cet excitement à celui que produisent sur l'estomac les liqueurs alcoolisées ; elles en stimulent, elles en exaltent d'abord la force et la sensibilité, pour l'émousser ensuite, et l'épuiser, si leur action est trop forte, ou trop habituelle."

Spectacles should not be resorted to by myopic persons unless the near-sightedness is so great as to trouble them in their ordinary occupations; when first worn should be of the least concavity consistent with their usefulness; should be restricted to purposes for which they are actually needed; and as often as possible laid aside.

Lastly, of the various circumstances above named as tending more or less to render use of the eyes fatiguing, none, and perhaps not all united conduce so much and so often to this effect as *earnest mental effort.* The activity and fulness of the blood-vessels of the brain are augmented during exercise of this organ; the ophthalmic artery which supplies the circulation of the eye and its appendages leaves the internal carotid after it has entered the cavity of the cranium, and it is therefore anatomically reasonable, that when the mind is in active exercise, the supply of blood to the whole ocular system

should be larger than usual. This fact is in inflammatory affections of the eye sometimes visibly demonstrated, it being a common observation in such cases, by physician and patient, that the redness and other symptoms are aggravated by any mental excitement, such as conversation, or listening to reading. The ciliary processes are certainly highly vascular; if they have any action whatever in the adjustment of the focal distance of the eye, this action, whether muscular or erectile in its character, must be attended with a very considerable influx of blood into them; and this influx is most likely to become excessive, other things being equal, when the vis a tergo is greatest, when the activity of the brain calls for a more rapid flow of blood through the artery from which, in common with the eye, its blood-vessels are supplied. It is a fact which cannot be too forcibly insisted upon, that morbid sensibility of the retina is rarely to be met with in persons whose use of the eyes is only mechanical, however minute the objects upon which they are employed, or however long-continued the use of them; that it seems almost always to originate in over-use of the eyes for purposes requiring intellectual effort. Of the forty persons so often referred to as the basis of the table at the close of this paper, thirty-one at least had been engaged more or less in literary pursuits,

or in book-keeping, which involved some degree of anxiety or calculation; it being understood that they were not all engaged in professional or literary occupations, strictly speaking, but that they were all, more or less, either in the way of business, improvement, or amusement, literary in their habits. Of the remainder, all, with the exception I believe of three, were sempstresses. And, if also it is considered how small is the number of people of literary habits or pursuits compared with those who make habitually close application of the eyes, but not of the mind, such as weavers, sempstresses, printers, shoemakers, and workers in various sorts of machinery, the dependence of morbid sensibility of the retina upon the combined influence of use of the eyes and of the intellect is very striking.

PREVALENCE OF THE DISEASE HERE.

That it is here a more frequent and annoying complaint than in Europe, is sufficiently indicated by the silence respecting it, or the very brief and vague allusion to it of the best European writers; and various reasons why it should be so may be adduced. The physical and mental characteris-

tics of the people of this country favor its production. More energetic and excitable, they are less robust, enduring, and phlegmatic than the natives of those countries of Europe with whose medical literature we are most acquainted.

Certain peculiarities of our climate have perhaps the same tendency; the extreme clearness of the atmosphere in fair weather, the frequent changes from sunshine to clouds, the sudden and extreme variations of temperature, and in winter the long continuance of snow upon the earth.

The standard of intellectual culture among the masses of the people is higher in this, or at least in the northern part of this country, than in the most favored countries of the old world. Relieved by the introduction of machinery and the immigration of the poorer classes of Europe from an immense amount of labor, now elsewhere, and here formerly exacted by the necessities of existence, and abundantly and cheaply supplied with the ordinary comforts of life, large numbers are able and willing to devote themselves to the arts which adorn it, to professional occupations, and to literary cultivation or amusement. To the close, often incessant application of the eyes of large classes of our community, is to be attributed the prevalence among us of diseases of the internal textures of the eye, and especially of *morbid sensibility of the retina*, a complaint which

is the more distressing inasmuch as it attacks almost exclusively the industrious and well informed, those whose eyes are most valuable to themselves and others.

Of the same tendency is the comparative cheapness of printing and publishing; the use of very small type, for what are called popular works, especially works of fiction which find numerous readers here; and the entire neglect to make any legislative provisions as to the size of the print which shall be used for text-books in seminaries of learning, or as to the many other circumstances which in the process of education may render use of the eyes more or less fatiguing, and cannot with safety be left altogether to the discretion of teachers and pupils. Some years ago an ordonnance appeared in the Allgemeine Zeitung, prescribing the size of the type which should be used in schools throughout the kingdom of Bavaria, and recommending certain rules as to lighting and ventilation of school-rooms; and similar provisions have since been made by the governments of other German States.

There are some other circumstances of minor importance, to the influence of which directly or indirectly, the prevalence of this complaint may be somewhat chargeable. Such are the general neglect to provide for the ventilation of dwelling-houses, the doors and windows of which in a

climate like this require to be kept closed during a great part of the year; carelessness as to the mode of admitting light, the windows of parlors very often being made to descend to the floor, and still oftener provided with blinds which admit the light in a broken, offensive manner; the very general taste for bright walls and ceilings, for glitter and gaudy coloring in the furnishing and decoration of apartments; the necessity of maintaining fires during a very long period, and the common use of anthracite coal, which rapidly absorbs the ordinary moisture of the atmosphere, and burns with an intense glowing brightness.

With the architecture and arrangement of most public edifices in this country, such as churches, school, lecture, concert, and court rooms, and theatres, great fault is to be found in these respects, and the more reasonably because from the height and size of these places, they usually admit of being well lighted and ventilated, and from the frequency and size of audiences collected in such places, they must be very widely prejudicial to the health and eyes of a community. By day the light which might come from windows in or near the roof is often horizontal to a large portion of the audience, or reflected from a neighboring wall, while the interior offers nothing for the eye to rest upon but a

glaring white-washed surface, or a huge decorative curtain of red cloth. The same general rules apply to the lighting of these as of private apartments, but their destination should be always kept in mind. In a school-room, for example, a much greater amount of light is needed for the ordinary exercises, than in a church where a very moderate amount of light suffices, and where a subdued light affords a salutary repose to eyes which have been toiling for six days.

With the evening illumination also of most places for public assemblage in this country great fault is to be found. Lights are scattered about in all directions, high and low, so that it is difficult to find a place where some of them will not be in direct view, while in some parts of the house, the least frequented it is true, but which must sometimes be resorted to, and which are often occupied by people whose means do not allow them to take a less elevated position, there will be within the range of vision not less than thirty or forty lamps. The injury and inconvenience to eyes is much the same that would result by day, if the great temple which we inhabit were lighted in the same way; if the sun were split into some thousand pieces, and so dispersed that in whatever direction the eyes were turned, they should be greeted by the direct rays from

some of its fragments. The indifference, ignorance, or false economy of those who have the control of public edifices, in this respect, is the more to be lamented because the adoption of a rational method* would afford to the community an example to be copied in their domestic arrangements.

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* A theatre at Brussels is thus lighted: "Compartments occupying one third of the entire surface of the ceiling are filled with panes of ground glass, above which lamps with reflectors are so placed as to throw down into the large area below a light nearly as strong, and quite as inoffensive to the eyes as that of day."

TREATMENT.

The indications to be fulfilled in the treatment of morbid sensibility of the retina are four; first, to give the eyes rest; second, to moderate the afflux of blood to the eye; third, to lessen and modify the sensibility of its sentient nerves; and fourth, to sustain, and if it is in any degree impaired, to invigorate the general health.

The rest which is demanded in most of these cases, is not an entire disuse of the organ, but a *relaxation of the adjusting apparatus of the eye*, by the relinquishment, wholly or in part, of occupations requiring the application of it to small and near objects. This purpose is most readily accomplished by habituating it to picturesque rural scenery. In persons accustomed to the use of concave lenses, the relaxation of the adjusting apparatus is, for reasons already given in speaking of the causes of this complaint, also very much promoted by ceasing altogether to use them; but if the near-sightedness be so extreme that glasses are really needed for ordinary exer-

cise out of doors, they should have the least possible concavity which will suffice for it.

If the exigencies of the case do not require, or if the condition of the patient does not admit of a complete cessation from labor with the eyes, great care should be taken so to conduct the limited use of them, that all those circumstances shall be avoided which in treating of the causes of morbid sensibility of the retina have been said to enhance unnecessarily the fatigue of using the eyes.

If the necessities of the patient really oblige him to work with his eyes beyond their ability, some degree of relief is often attainable by wearing, when applying the eyes, a pair of convex lenses of very low power. By slightly refracting the rays proceeding from a near object before they enter the eye, a less amount of refraction is required to be produced within, and of course a less amount is required of that effort which its adjusting apparatus must otherwise make in adapting it to a near object. Is it not probable that in some cases of beneficial effect asserted by M. Florent Cunier, Dr. Böhm, M. Sichel and others, to have been attained in impaired vision from the use of convex lenses, they had to do with cases analogous to this which we term morbid sensibility of the retina? that they were not altogether amaurotic cases, that not solely the

retina or optic nerve was at fault? that the adjusting apparatus of the eye was more or less implicated? and that the advantage was attributable not as they suppose to the invigorating, stimulating influence upon the retina, but to the aid and comfort given to the ciliary system and other parts concerned in the process of adjustment?

In a few instances I have been fully convinced that essential advantage was derived from convex glasses of very low power, even when the patient was not in the least degree presbyopic, but my own observation on this point has not been sufficiently extensive to speak of their general applicability in cases of morbid sensibility of the retina. When they are resorted to, the patient not being presbyopic, those of an exceedingly small convexity should be chosen. Until recently the least convexity obtainable at opticians was of forty-eight inch focus. Now, lenses may be very generally found of sixty inch focus, and an optician of Paris, at the suggestion of M. Sichel, has manufactured some of ninety-six inch focus; the curvature of these last being hardly distinguishable from a plain surface.

Of course where it is practicable in this disease, entire rest, certainly for a period, is to be preferred to any artificial aid, and when in any case a resort to convex lenses is advised, the

patient should be made to understand that they are intended to lighten, not to protract his labors.

In the earliest stage of most, perhaps of all cases, rest, partial or entire, from close application of the eye, would suffice for recovery; but at this period professional counsel is not often sought, and the rest which may be recommended still less frequently persisted in for a sufficient time.

In cases characterized by any considerable degree of intolerance of light, the state of repose necessary for their recovery will involve to some extent a reduction of the ordinary amount of light. It is impossible to lay down any precise rules. In general the patient should seek the greatest rather than the least amount of light which is convenient to his eyes, and as soon as possible restore them to its ordinary influences. When he is within doors, the eyes should be accommodated by diminishing the general light of the apartment, rather than by cutting it off by any contrivance appended to the head. When for exposure out of doors such contrivances are needed, those should be selected which will least interfere with the access of air to the eyes and to the lungs. Deep bonnets and hats, an umbrella or sun-shade, or a projecting shade upon the forehead, are the best, if they afford sufficient

protection to insure comfort. Plain colored spectacles are to be preferred to goggles, and both to veils.

In many cases of morbid sensibility of the retina, use of the eyes in certain ways is not at all incompatible with the repose which they need, and may be positively beneficial. Such occupations as hunting, playing at ninepins, billiards, and various out-of-door games, and with a proper arrangement of light, viewing scenic representations are useful in relaxing the adjusting apparatus of the eye, at the same time that they provide for bodily exercise or mental recreation.

Secondly, *to moderate the afflux of blood to the eye.* This is to a great extent accomplished in fulfilling the first indication of relaxing the adjusting apparatus by abstaining from close application of the eyes.

The agency of mental activity in the production and increase of this complaint has been heretofore spoken of in treating of its causes, and was there accounted for from the augmented cerebral circulation of blood. But whether this be the true explanation of its agency or not, it is well known to all who have had occasion to observe this complaint, that in severe cases mere rest of the eyes does not suffice, but must be accompanied by repose from thoughtful, anxious occupation of the mind.

At the very earliest period of this disease, if the patient be healthy, and especially if he is young, local depletion by leeches or cupping will be useful, and if he is plethoric, general depletion may be more useful still. These means should not in general be adopted in any case of more than a few months' duration, can in no case be long persisted in with advantage, and when they are resorted to, the most rigid observance of rest must be insisted upon. Of the same tendency are the various revulsive and derivative agents, such as setons, issues, moxas, the pustular eruptions of tartrate of antimony and croton oil, blisters, dry cupping, &c. Among these the most energetic and permanent may for persons of uncommonly robust habit be useful; but in general those are most to be relied on which are not violent and exhausting in their action, and which from their temporary duration admit of frequent renewal, and the location of which also can be readily changed. Small blisters of cantharides, extemporaneous vesication by ammonia and dry cupping, are perhaps the most generally available of all this class of remedies. The places upon which blisters are most advantageously applied are the space behind the ears, the temples, and the neighborhood of the supraorbitary branch of the fifth pair. Of blisters in the immediate vicinity of the eye it is sometimes said, that they

are found to weaken the organ, but this I believe the exception to the general fact.

Dry cupping upon the back of the neck and elsewhere is a convenient, but as it is ordinarily practised, not a very effectual means. That it is capable of being rendered more so is evident from the following remarks upon it: "At a meeting of the South Western Branch of the Provincial Medical Association at Plymouth, Dr. Marsden exhibited an apparatus, the invention of M. Junod, for exhausting the air over a large surface. It was made of copper in the shape of a boot, and is applied as one, having an India rubber top to tie round the thigh, and render it air tight. The air is then exhausted by a syringe. By the application of this apparatus, the leg may be distended to double its ordinary size, the pulse is at first quickened, but is gradually reduced both in frequency and strength, and even syncope may supervene: very little pain attends the operation. After the removal of the apparatus the blood gradually returns to its course, and in a couple of hours the swelling of the leg subsides. Experience has proved that sixty operations on the same leg with one or two days' interval may be attended with no injurious effects to the nervous system. Dr. Marsden, after describing an establishment under the superintendence of Dr. Bonnard of Paris, entirely devoted to the appli-

cation of this instrument, and having dwelt upon the success attending its employment by Dr. Cerise, another Parisian physician, detailed the histories of several cases in which he had himself witnessed beneficial results, as in amaurosis, deafness, sore throat, chlorosis, amenorrhea, croup, phthisis, &c." Prov. Med. Journal, July 10, 1846, p. 224.

The effect of cold topical applications, whether by evaporating lotions or by simple cold water, is often highly salutary, either by repelling the blood from the congested vessels, by its sedative influence, or both. It rarely fails to afford temporary relief, and contributes as much as any known remedy to final recovery. It may be often advantageously used in connection with other means, and in some cases of long standing is the only one from which a sensible benefit is derived. Cold water admits of great variety in its application. Wet compresses to the eyes, cold affusion to the head and eyes, and the douche, are the most common modes, and all of them to be effective require to be continued for from five to twenty minutes, and to be repeated two or three times daily. A cold shower bath at the same time that the feet are immersed in warm water is serviceable when there is evidence of general congestion of the head.

The most convenient and agreeable, and perhaps

the most beneficial mode of applying cold water, is by means of a douche, in which the jet of water is broken into numerous small streams, by passing through a plate thickly perforated with fine holes.*

Pressure steadily applied upon the temporal artery and upon the globe itself, is in some few cases said to afford temporary relief from pain, and in one instance I have observed this effect from pressure upon the globe, notwithstanding that the first sensation from the pressure was of tenderness. The means enumerated under this head, and others of the same tendency, would seem most appropriate to, and especially called for in cases, the paroxysms of which are marked by a visible injection of the globe, although their usefulness is by no means confined to such.

Thirdly, *to lessen and modify the sensibility of the sentient nerves of the eye.* The agents to be employed with this view may be classified as *counter-irritant*, and *sedative*, though of some particular agents it is difficult to say to which class, as far as regards their action in this disease, they belong.

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* I have just now met a gentleman whose circumstances do not admit of entire rest of his eyes, who says that by the occasional use of a douche of this description to the eyes, he accomplished three times as much labor as he could otherwise perform with them.

In the class of counter-irritants must be comprehended many of the articles just mentioned, as having, by their revulsive or derivative action,* a tendency to relieve the ocular congestion in morbid sensibility of the retina, and it might be indefinitely increased by the enumeration of various other articles, which, according to the time and manner of their application, and the combinations in which they are used, may be rendered either derivative and counter-irritant, or simply counter-irritant; as, for example, nitric, strong acetic, and other acids, turpentine, cantharides, iodine, mustard, capsicum, &c.

But there are some articles which, inasmuch as they do not affect the capillary vessels,† and do very powerfully affect the sentient nerves of the skin, may be considered to be counter-irritant without being derivative or revulsive. Of this character are veratrine, aconitine, digitaline, delphine, and other vegetable alkaline principles, although in the case of some of them, as aconitine, an alcoholic preparation of the plant itself is equally effective. Although they are unques-

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* According to Dr. Granville, revulsion begins where counter-irritation ends.

† This is not invariably true, for in some persons veratria applied to the skin does produce an eczematous eruption.

tionably counter-irritant, it is probable that they are in some way sedative in their influence. Most of them taken internally depress the general circulation, and may be presumed when used epidermically, as in this complaint, to exercise a similar influence in less degree.

Of these irritants veratria and aconitia are the ones which have been most used, and to which the experience of the profession in this country seems to accord the greatest value in the treatment of the morbid sensibility of the retina.

Of veratria it is said by Dr. Turnbull, whose encomiums upon it in the treatment of neuralgia and other painful affections, are not fully confirmed by later writers, that he has observed "from the internal use of it, as well as from its application to the pit of the stomach, a diminution in the frequency and force of the pulsations of the heart." Applied to the skin in the neighborhood of the eye it gives decided and speedy relief to the pain accompanying this disease, more frequently than any other similar application. But it does not in all cases afford relief. It is believed to be oftener serviceable in chronic than in very recent cases, and in cases which are free from, than in those which evince much congestion of the head or eyes. In cases in which it fails to relieve, it may aggravate the pain; and therefore, before directing it as a permanent part

of the treatment, it is prudent to watch the result of the first one or two applications. No effect whatever will arise, unless the peculiar sensations which it causes in the skin are felt.*

Of aconitia, it may be said that its effect in relieving the pain of morbid sensibility of the retina is as speedy and decided as that of veratria, but that it is not useful in so large a proportion of cases. While its sensible counter-irritant characteristics are not so enduring as those of veratria, the prickling, burning sensation † common to both being followed in the case of aconitia, by a feeling of numbness and constriction of the skin, it is supposed to exercise a more calmative and sedative influence upon the vascular and nervous systems. The testimony with regard to its sedative effect upon the circulation is much more emphatic than that in reference to the same effect of veratria. Dr. Lombard of Geneva, as confirmed by Dr. Dunglison, ‡ says, that it exerts a decidedly sedative effect on the heart. Among the practical inferences of Dr. Flemming § are, first, "that it is calmative

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* Magendie, Turnbull, Scudamore, Pereira, Dunglison, Ebers, Hays, &c.

† According to Turnbull, *electro-stimulative.*

‡ New Remedies, p. 46. Orfila Toxicologie, vol. ii. p. 21. Pereira, Mat. Med. vol. ii. p. 753.

§ Dunglison, New Rem. p. 47.

anodyne, and anti-spasmodic ; second, that it is advisable in any disease in which the circulation of the brain is excited ; third, that it is contra-indicated in headache arising from anæmia or chlorosis, and wherever there is a torpid or paralytic condition of the muscular system."

In a review of Dr. Flemming are the following remarks pertinent to the use of aconitia or aconitine, which we are here considering. " Aconitine acts as a direct sedative to the nerves of sensation. This is quite true as far as it goes, but it scarcely goes far enough ; for, besides being sedative, aconite is alterative also, since the topical effects are not those which would arise solely from sedation. The heat, the peculiar tingling, the sense of swelling and distention, fully prove that sensation or feeling is altered in quality as well as lessened in intensity. The author makes a very curious and interesting observation, new to us. After stating that contraction of the pupil takes place, and continues many hours from painting the conjunctiva with the ointment of aconitine, and referring to Dr. Pereira's experiments in amaurotic cases, the author observes, ' When, on the other hand, the ointment of the alkaloid or the tincture of the root is applied to the temple or forehead, the pupil occasionally becomes dilated. These phenomena are either effected by reflex action through the third or

fifth nerves, or perhaps by imbibition, but why such entirely opposite effects should occur in the two cases, it is difficult to understand.'

"Applied to the lids no effect on the pupil is observed from either, perhaps because sufficient friction cannot be used to develop their effects."*

It will often be found that in a case which is relieved by one of these articles, the other is useless or injurious; and although it is not possible without a trial to determine in any case which of the two if either will be serviceable, the circumstances which should induce a preference of aconite, are youth, a robust habit, an active circulation, an early period of the disease, congestive tendencies about the head and eyes, and especially the occasional coming on of pain without any immediate provocation of use or exposure.

These alkaloids are conveniently applied by friction, either in the form of ointment or alcoholic solution. By many the saturated tincture of the root of aconite is preferred to its alkaline principle, the sensible effects being the same.† By M. Lafargue a saturated solution of veratria has been applied by puncture, as in the process of vaccination.‡ No effect upon the symptoms

* Medico-Chirurgical Review, Vol. iii. New Series.

† Braithwaite's Retrospect, Pt. 11, p. 19.

‡ Edinburgh Medical and Surgical Journal, Oct. 1843.

of this complaint can be expected, unless the sensations peculiar to these articles are produced in the skin. Of both it must be observed that they sometimes aggravate the symptoms they are expected to relieve, and that after one or two trials with this result, the use of them should not be persisted in. Any preparation containing veratria must be carefully prevented from reaching the conjunctiva.

Veratria and aconitia, especially the last, are most effectively used in the neighborhood of the eyes, over the brows or on the temples; but counter-irritation by other agents seems to be considered more serviceable behind the ears, upon the back of the neck, along the spinal column, and in some conditions of the system in the pelvic region or upon the lower extremities.

Stimulating collyria are directed by some practitioners,* and supposed to have the counter-irritant action, or from the presence of some anodyne ingredient an effect at once counter-irritant and sedative. They are also in this as in other diseases temporarily depletive by promoting the secretion of the lachrymal glands.

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* Mr. Lawrence says: "Gentle stimuli to the surface of the eye and lids have sometimes appeared to do good. The vapor of ammonia or ether, the vinum opii, and a stimulant liniment to the edges of the lids may be employed." Hay's ed. 521.

My own experience is decidedly adverse to all applications directly to the conjunctiva in simple morbid sensibility of the retina. A transient relief may be felt, but it is at the risk of a permanent increase of the irritability of the organ. The collyria oftenest used in this complaint, and probably the least objectionable, are those which contain either nitras argenti or opium.

The sedative agents by which in this complaint it is sought to lessen or modify the sensibility of the sentient nerves of the eye, are the same which are used externally to relieve pain in other complaints, such as opium, camphor, hops, cicuta, hyasciamus, hydrocyanic acid, poppies, canabis indica, &c.

They are used for the most part enepidermically or epidermically, but sometimes endermically,* always near the eye, and often upon the lids; are prepared as tinctures, extracts, decoctions, infusions, vapors, &c. and commonly applied warm. Their alkaline principles, as morphia and hyosciamia, may be used in the form of ointment, or alcoholic solution, but do not seem to be more efficacious than the plants from which they are derived. Some of these articles produce a violent irritation upon the skin, as cicuta, digitalis, &c.

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* Pereira, Mat. Med. vol. i. p. 164.

In cases of extreme severity, the internal administration of anodynes may be required, and those should be chosen which will create the least constitutional disturbance. I have never seen more than two or three cases in which it was thought expedient to use them in this way.

In view of the relief sometimes afforded by external sedative anodyne applications, and of that which always results from the cessation of close application of the eyes, it is worth considering, whether in certain conditions of this complaint advantage may not be derived from subjecting the iris, and with it — if what we have assumed as to the adjustment of the eye be true — the ciliary system, to the relaxing or dilatant effect which belongs to many * substances of this class.

To the agency of belladonna in relieving the intolerance of light which attends strumous ophthalmia or retinitis, strong testimony is given by Dr. Elliotson, Mr. Arnott, Baron Dupuytren, Dr. Schur and others.

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* Benedict, in his Handbuch der Praktischen Augenheilkunde, B. i. p. 7, gives the following list of articles possessing this property: "Stramonium, belladonna, hyosciamus, cherry laurel, opium, succory, coffee, bitter beers, bitter almonds, gentian, quassia, simaruba, centaureum, cynoglossum, ammoniacum and galbanum, and the various preparations of lead." To this catalogue the active principles of many may be added, as atropia, hyosciamia, hydrocyanic acid, &c.

In two cases I have applied, with the effect of dilating the pupil, the extract of stramonium around the eyes of persons suffering extremely with *morbid sensibility of the retina ;* there being in one great intolerance of light, and in the other severe pain deep seated in the orbit with little more than common sensibility to light. In the first case, the patient, being already necessarily confined to a dimly-lighted apartment, believed herself to be more relieved than by any former means. In the second, the pain was mitigated, but whether owing to the relaxing and anodyne influence of the stramonium, or to the quiet, and diminished light, which were recommended when the pupil became dilated, is doubtful.

In both cases the remedy has been used so few times, and so recently, that I am not competent to speak of its ultimate effect, but would suggest, that dilatants deserve to be tried in some cases of this disease; for though inadmissible in persons still able to bear ordinary light, they certainly are not to be objected to on the ground of admitting an excess of light into the eyes of persons who are obliged to seclude themselves very much from it. For a person confined within doors with this complaint, it is as practicable to adapt the amount of light to a dilated, as to a natural state of his pupils. M. Desmarres recognises the utility of belladonna, but whether to

the extent of producing dilatation he does not say. His words are, "the excessive sensibility of the retina should be combatted by friction around the orbit, of belladonna and camphor combined, or what appears to me preferable, by applying, for one or two hours daily, compresses dipped in a very cold infusion of the leaves of belladonna and jessamine." *

The surgical treatment proposed for the cure of this complaint is too preposterous to be thought of, unless the patient is affected with strabismus.

The division of the external muscles of the globe has already been alluded to in speaking of the Muscular Amaurosis of Messrs. Adams and Hocken, and the Kopiopie of M. M. Petrequin and Bonnet. But, aside from several serious objections, such as giving an unnatural prominence to the eye, impairing the voluntary control of its movements, or perhaps creating a squint, very little effect upon this disease could be expected from relieving the supposed excessive action of muscles, which if our suppositions are true have so little to do with the adjustment of the eye to distances.

Of specific remedies, to be used either internally or externally, there are none.

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* Traité Théorique et Pratique des Maladies des Yeux, p. 691. Paris, 1847.

A few of the formulæ most approved for topical applications will be found appended, but of medication in this complaint it must be remembered that it should never compromise the general health, or much reduce the strength; that it is only palliative, or at most auxiliary; that rest more than any thing conduces to recovery, and that without rest recovery is hopeless.

Lastly, *to sustain, or, if it is impaired, to restore the general health.*

It has been said, that a cure is never to be looked for as the direct consequence of the removal of any other disease under which the patient labors; but it must be added here, that the removal of some general or local disease may be a necessary preliminary to the recovery from morbid sensibility of the retina.

Persons affected with it are moreover often, from the nature of their occupations, if not positively diseased, enfeebled, and will seldom begin to progress towards the recovery of strength in the eyes until the system is re-invigorated.

The relief of other co-existent disease, or the restoration of vigor to a weakened frame, may be, and is in many cases therefore a more urgent matter of study to the physician, than the treatment to be addressed especially to this disease.

Although little can be or need be said here with regard to a part of the treatment which

must be suited to a great variety of exigencies, and be determined by principles familiar to every practitioner, it is impossible to over-estimate its importance. Greater good is often effected by a radical and judicious reform in the general habits, than by any treatment or precautions directed solely to the eyes; and no hygienic observances should be neglected which can in any degree contribute to the healthfulness and strength of the patient. Those which, with particular reference to this complaint, probably require to be most frequently and emphatically recommended, are moderation in sexual indulgence, and out-of-door exercise.

This disease may be complicated with others, especially with amaurotic and chronic inflammatory affections of the eye and its appendages, and the treatment must be modified accordingly.

The *prognosis* as to ultimate recovery in cases of simple morbid sensibility of the retina is favorable, but as regards speedy recovery is in all cases doubtful, and in most, unfavorable. In the statement of the symptoms from page fourth to page twenty-first of this Essay, when treating of any which are believed to have a bearing upon it, allusion is made to the prognosis.

FORMULÆ.

℞. Liquor Ammoniæ fort ℥ ss.
Spts Rorismarini ℥ iii.
Spts Camph. ℥ i.
M.

℞. Liquor Ammoniæ fort ℥ v.
Spts Rorismarini ℥ ii.
Spts Camph. ℥ i. Granville.
M. Applied by holding upon the skin a bit of cotton wool moistened with it from thirty seconds to three minutes, according to the intensity of the effect intended.
M.

℞. Aquæ Ammoniæ dilutæ ℥ ii.
Aquæ Lavandulæ ℥ ss.
M. Bath around the eye, and with an equal quantity of water upon the lids.

℞. Veratria ℥ i.
Rectified Spirit ℥ ii.
M.

℞. Veratria ℥ ss.
Olive Oil ℥ i.
Prepared Lard ʒ i.
M. Embrocation and Ointment of Turnbull.

℞. Tinct. Capsici concentrati ʒ i.
Veratria gr. iv.
M. In which form, says Dr. Turnbull, the Veratria "acquires increased activity."

℞. Aconitia gr. xvi.
Olive Oil ℥ ss.
Lard ʒ i.
M. Applied by friction with the finger.

℞. Aconitia gr. viii.
Rectified Spirit ʒ ii.
M. Used by friction sponge, care being taken not to apply it when the skin is abraded. — *Turnbull. Pereira*, vol. ii. p. 757.

For both the preceding may be substituted,
℞. Saturated tinct. of Root of Aconite.
M.

℞. Delphine gr. x to xxx.
Alcohol ʒ i.
M.

℞. Veratrine gr. vi.
Delphine gr. iv.
Ung. Aquæ Rosæ ℥ i.
M.

℞. Digitaline gr. 770.
M. Dissolve in a few drops of alcohol, and incorporate with lard (axonge balsamique) ℥ ii ss.
Homolle and Quevenne, Dunglison.

℞. Tinct. of Aconite.
Tinct. of Belladonna $\overline{aa}$ ℥ ii.
Rose Water ℥ ii.
M. Embrocation. — *Dr. Eades. Braithwaite,* Part xi. p. 11.

℞. Tinct. Stramonii.
Tinct. Camphoræ $\overline{aa}$ ℥ ii.
M. Around the orbit.

℞. Ol. Olivæ ℥ ii.
Hyosciami Nigri ℥ ii.
Nicotianæ Tabaci ℥ i.
M. Around the orbit. — *Graefe.*

℞. Spts. Lavandulæ ℥ i.
Æther Sulphuric.
Tinct. Anodyne simp. $\overline{aa}$ ℈ i.
M. On the lids. — *Fabini.*

VAPORS.

℞. Ether Acetous or Chloric ℥ i.
Vin opii ℥ i.
M. Vapor to the eyes, evaporated in equal parts of warm water, or in the palm of the hand.

℞. Aquæ Ammoniæ Dilut. ℥ i.
Aquæ Rosæ ℥ i.
M.

Collyria.

℞. Vin opii.
Aquæ Rosæ ā ā ℥ i.
Aquæ Distillatæ ℥ i.
M.

℞. Nitras Argenti gr. i to iii.
Aquæ Distillatæ ℥ i.
M.

ANALYSIS OF FORTY CASES

OF

MORBID SENSIBILITY OF THE RETINA.

Sex.

Males	16
Females	24 — 40

Age.

Previous to the 10th year	1
Between the 10th and 20th year	22
" " 20th and 30th "	7
" " 30th and 40th "	4
" " 40th and 60th "	6 — 40

Color of Iris.

Dark in	23
Light in	17 — 40

Eyes.

Unequally affected in	13
Right most affected in	8
Left most affected in	5

The focal distance being in three of these cases unequal.

SYMPTOMS.

Intolerance of light existed in . . . 30

Visible injection and suffusion in 15 out of 20. (From this estimate, all cases recently preceded by inflammation of the appendages or external textures of the eye, and also presbyopic cases, are excepted.)

Temporary affection of vision in 28

Muscæ volitantes in 14

Having previously been observed in . . . 6

The complaint was preceded by

Myopy in 9

Which also came on during the complaint in 6

Presbyopy in 6

Some disease of the eye or its appendages in . 16

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