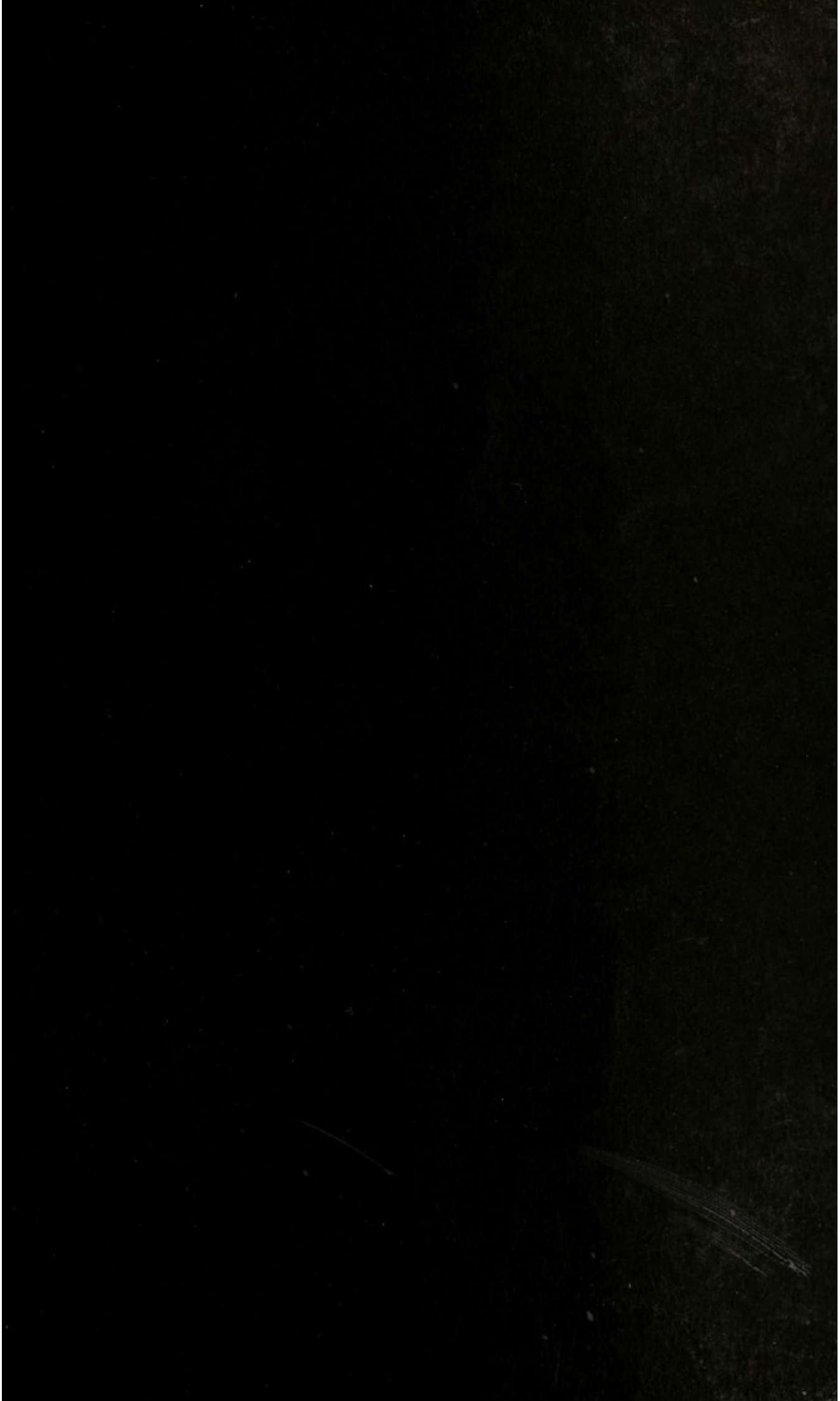
On the condition of the fundus oculi in insane individuals / by Joseph Wiglesworth and Thomas H. Bickerton.



With the Compliments of the Author.

10.

ON THE

CONDITION OF THE FUNDUS OCULI

IN

INSANE INDIVIDUALS.

BY

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PLATE I.

Fig. 1.

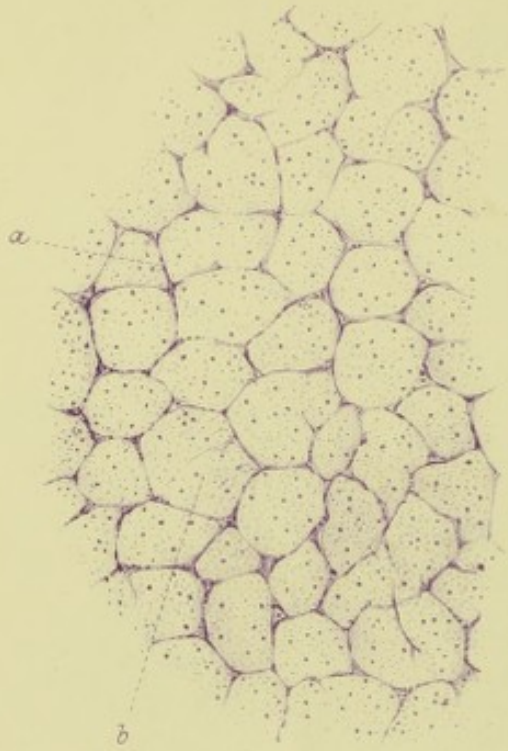

Fig. 3.

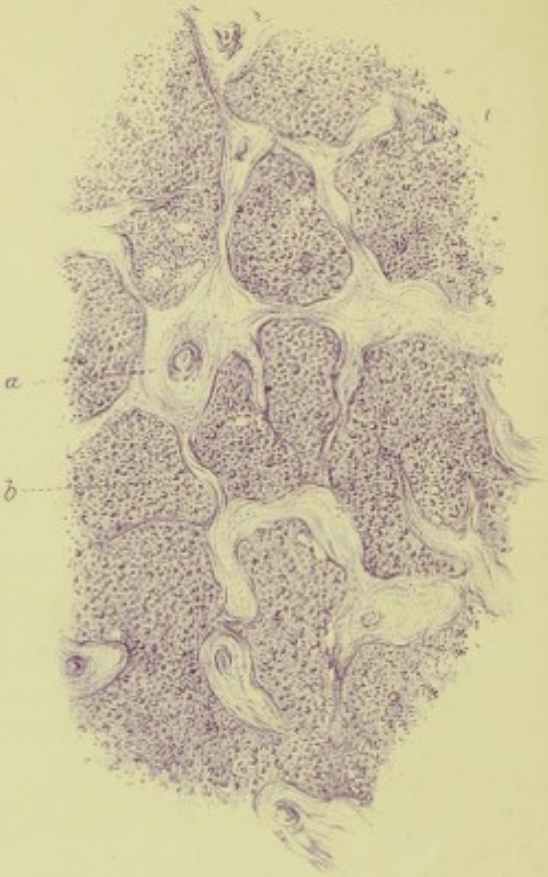

Fig. 2.

J. R. L. Dixon del.

T. Huth, Lith^r. Edin^r.

DESCRIPTION OF PLATES

Illustrating the paper "On the Condition of the Fundus Oculi in Insane Individuals," by Dr. J. WIGLESWORTH, and Mr. BICKERTON.

PLATE I.

Fig. 1.—Transverse section of optic nerve, a short distance behind eyeball; from a case of General Paralysis of 3½ years' standing. (Case No. 23 in Table I.) Normal. × 50.

(*a.*) Normal trabeculæ.

(*b.*) Healthy nerve tubules.

Fig. 2.—Transverse section of optic nerve a short distance behind eyeball; from a case of General Paralysis. (Case No. 13 in Table I.) Atrophy; consecutive to slight chronic interstitial neuritis. × 50.

(*a.*) Thickened internal sheath.

(*b.*) Thickened trabeculæ.

(*c.*) Nerve tubules undergoing granular degeneration.

Fig. 3.—A portion of Fig. 2, × 300.

(*a.*) Greatly thickened trabeculæ.

(*b.*) Nerve tubules undergoing granular degeneration.

Plate II.

Fig. 4.—Transverse section of optic nerve a short distance behind eyeball; from a case of General Paralysis. (Case No. 28 in Table I.) Atrophy; primary at disc. × 50.

(*a.*) Greatly thickened internal sheath.

(*b.*) Thickened trabeculæ.

Fig. 5.—A portion of Fig. 4, × 300.

(*a.*) Thickened trabeculæ.

(*b.*) Neuroglia corpuscles, and small round cells.

(*c.*) Nerve tubules undergoing atrophy.

(The artist has here depicted the best part of the section; in most places the trabeculæ are thicker and closer together than are here represented.)

Fig. 6.—Transverse section of optic nerve, close behind eye-ball; from a case of General Paralysis. (Case No. 42 in Table I.) Early cirrhosis. × 300.

(*a.*) Thickened trabeculæ with well-marked nuclear elements.

(*b.*) Hypertrophied neuroglia corpuscles.

(*c.*) Healthy nerve tubules.

PLATE II.

Fig. 4.

Fig. 5.

Fig. 6.

J. R. L. Dixon del.

F. Huth, Lith^r Edin^r

ON THE CONDITION OF THE FUNDUS OCULI IN INSANE INDIVIDUALS.

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AND

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SINCE the introduction of the ophthalmoscope, the investigation of the condition of the fundus oculi in insane individuals has occupied the attention of many observers; though in this country, at least, the published observations are not very numerous. It cannot be said, however, that the subject is one which is yet by any means fully elucidated; indeed, the discrepancies between the recorded observations of different investigators is so great, that to reconcile the opposing statements is no easy task. With the view of endeavouring to throw some light on the question, the investigation shortly to be described was undertaken, and though we are sensible that the number of observations is too small to admit of anything like a settlement of the points in dispute, we think that a record of them will not be without its value.

It need hardly be said that in many insane individuals, the use of the ophthalmoscope is attended with much difficulty; some patients give trouble by their restlessness and turbulence and by the impossibility of fixing their attention; others again become much alarmed when they are brought to the "dark room," and no persuasion or assurance will get them to submit to an examination. By taking care however, that the pupils are thoroughly dilated with atropine, and by the use of patience and perseverance, these difficulties can in the great majority of cases be overcome. We have, however, in a few instances, been compelled to abandon the examination as altogether impracticable, and in a few other cases, only an imperfect view being obtained, we could not feel certain

of the result; all such cases are however excluded from the descriptions which follow, which deal only with those about which we feel that we can write in full confidence.

Our observations have been conducted with the most recent refracting ophthalmoscopes, the "indirect" method having been in almost every case supplemented by the "direct;" we have also, in the majority of cases, taken care to note such errors of refraction as existed, and have endeavoured to measure the amount of these as closely as possible. In the case of General Paralysis we have further supplemented the investigation by the use, wherever practicable, of test types, with which we have obtained reliable results in a much larger proportion of cases than we anticipated when we commenced. It may indeed be objected by some, that subjective examination in persons mentally alienated can never give results of scientific value, but this objection applies only to the negative aspect of the question; if a lunatic *reads* correctly certain test types it is obvious that he can *see* them, whereas the failure to read them wholly or in part, does not necessarily imply inability to *see* them, since his incapacity in this respect may be due to lack of attention, defect of mental power, or other cause. We should have thought indeed that the careful use of test types as a supplementary aid in an investigation of the kind before us scarcely required defence, were it not that no less an authority than Dr. Clifford Allbutt has stated[1] "that failure of sight as tested by types is wholly an oculist's symptom, and bears little proportion to the amount of atrophic or other disease that may be seen in the nerve." It is indeed well known that a patient's sight may be perfectly intact, even when intense papillitis is disclosed by the ophthalmoscope, the explanation being that the conductivity of the nerve tubules is as yet unimpaired; and we quite admit that it is often impossible, from a mere inspection of an atrophied disc, to pronounce definitely as to a patient's acuity of vision, but we think that the cases of optic nerve atrophy have yet to be described in which a patient is capable of reading J 1 and $\frac{20}{20}$, and in a doubtful case where the diagnosis lies between a slightly atrophied and an anæmic optic disc, we think the use of test types may often give valuable help. And this leads us to

[1] 'The Ophthalmoscope,' p. 380.

make a few remarks on the normal colour of the disc; it can, we think, hardly be doubted, that the earlier observers took too rigid a view as to the physiological differences in colour here displayed; it was not fully recognised, and is even now, we think hardly sufficiently so, that the colour of the disc may vary in different individuals from an almost uniform redness to an almost uniform pallor, and yet the disc in question may be in a perfectly normal condition. We have an instructive case under observation now, in the person of a female epileptic whose discs are of an almost uniform whiteness strongly suggestive of atrophy, and yet the patient can read *perfectly* J 1 and $\frac{20}{20}$. In fact we cordially endorse the statement made by Dr. Gowers,[1] "that the tint of the optic discs may vary as much as the tint of the cheek."

We wish it had been possible to have in addition tested the field of vision, but we do not consider that reliable results could be obtained by this method in the persons of lunatics.

In some of the cases of General Paralysis, we have made a microscopical examination of the optic nerves and discs after death, but we have not thought it necessary to insert any account of the naked eye appearances of these parts, as we consider that these appearances furnish *usually* but a very rough guide to the intimate structure, and are therefore not to be relied upon.

Our observations have all been made in the wards of Rainhill Asylum, and we are indebted to Dr. Rogers, Medical Superintendent of that Institution, for the facilities afforded us in the examination of patients. The investigation has extended over a period of two and a-half years, and has embraced cases exhibiting every variety of mental disorder. The results will be given in detail as we proceed, but we may say at once that the actual lesions noted have been comparatively few.

A word or two first, however, with respect to the classification of mental disorders here adopted. For a purpose such as that before us, we think that the simpler we can make this, the better, and the old division of Insanity into Mania, Melancholia and Dementia, has at least the advantage of simplicity, and the further one of being in possession of the field: many varieties of mental disorder are, however, included under each of these heads which cannot in strictness be grouped together,

[1] 'Medical Ophthalmoscopy,' 2nd edition, p. 4.

and therefore, whilst retaining it as our basis we have elaborated it in detail. In the first place then, we divide all our cases into General Paralysis, and Not-General Paralysis; and the latter class we subdivide as follows: of Mania we make four subdivisions; "Acute" including all recent cases slight and severe; "Puerperal," which is of course simply a variety of acute, but to which it is perhaps better to assign a separate heading; "Chronic"; and the "delusional form," which includes the cases commonly known as "Monomania." Of Melancholia we make a threefold division, into "active recent," "passive recent," and "passive chronic."

Cases of Mental Stupor we include in a class by themselves. Cases of Dementia are subdivided according as they are "Primary" (including what is known as Acute Dementia whether recent or chronic), or secondary; the latter again into cases secondary to Mania and those due to gross organic disease of the brain, such as old Cysts, Hæmorrhages, &c., and which may be styled "organic;" whilst a fourth subdivision comprises all "senile" cases, *i.e.* cases of primary dementia in old people not known to be due to gross changes.

We make a separate division of Epilepsy, which again we subdivide according as it is associated with imbecility—with slight—or with grave—impairment of the mental faculties. Cases of Imbecility, uncomplicated with Epilepsy, are also included under a separate heading.

Our classification will then stand thus:—

I.—General Paralysis.

II.—Not-General Paralysis
- 1. Mania
  - *a.* Acute.
  - *b.* Puerperal.
  - *c.* Chronic.
  - *d.* Delusional form of.
- 2. Melancholia
  - *a.* Active, recent.
  - *b.* Passive, recent.
  - *c.* Passive, chronic.
- 3. Mental Stupor.
- 4. Dementia
  - *a.* Primary (recent and chronic)
  - *b.* Secondary to mania.
  - *c.* Organic.
  - *d.* Senile.
- 5. Epilepsy
  - *a.* With imbecility.
  - *b.* With slight dementia.
  - *c.* With grave dementia.
- 6. Imbecility (uncomplicated with epilepsy)

Taking all forms of Insanity together, we have examined 313 different cases (persons); of these 66 were General Paralytics, and 247 not-Paralytics; of these latter in 204 (82·59 per cent.) the optic discs, and main retinal vessels were perfectly normal, whilst in the remaining 43 (17·40 per cent.) these parts were either abnormal or were marked as doubtful, *i.e.*, in these latter the changes were so slight, that no decided opinion as to their abnormality could be formed. In some of the abnormal cases again, the changes noted (as will be seen in detail as we proceed) were clearly due to causes such as Bright's disease, which had no connection with the patient's lunacy or at best but an indirect one; and these cases must of course be allowed for, in endeavouring to trace a connection between the patient's mental (cerebral) state, and the condition of his optic discs or retinal circulation. Furthermore, as is well known, a variety of functional constitutional states are at times associated with changes in the discs, altogether apart from the question of lunacy. The effects of errors of refraction have also not unfrequently to be discounted. If due regard be paid to these considerations it will be found that the percentage of cases in which we have noted a distinctly abnormal condition of the discs, &c., in connection with mental alienation (other than that associated with General Paralysis) is a very small one.

We will now proceed to give in detail the observations we have made under each head; after which we purpose briefly to refer to the more important communications on the subject that have appeared in this country, and finally to draw some conclusions.

We will begin with cases of General Paralysis, this affection being not only the most important, but that in which we found by far the largest proportion of departures from the normal condition.

General Paralysis of the Insane.

We have examined 66 cases coming under this designation; most of them have been examined more than once, and many several times; in all, 135 separate examinations have been made. Of these 66 cases, 49 were males and 17 females; the average age of the patients was 40·28 years.

Of the 66 cases, 43 (65·15 per cent.) we considered to be normal; 15 (22·72 per cent.) were decidedly abnormal, whilst in 8 others the changes were so slight that we did not like to pronounce them positively abnormal; if however these be added to the 15 distinctly abnormal ones, we get a percentage of 34·84 per cent., under this latter category.

A qualification is here requisite; in one of the cases (No. 37 in table), the changes noted were (mainly, at any rate) due to Glaucoma, and are therefore foreign to the issue before us; a similar remark applies to two others (Nos. 36 and 62) in which the abnormalities present were due in all probability to the associated retinitis pigmentosa; it would, we think, be safer to exclude these cases, which would therefore leave 12 distinctly abnormal, to which if we add the 8 doubtful ones we should get a percentage of 30·30.

We append a table giving details of every case examined, and in the following account the numbers given refer to the numbers of the cases, in this table. (See pages 32 to 43.)

We have there divided the disease into stages, first, second, and third; the first being the early period of mental excitement and exaltation; the second dating from the subsidence of excitement, may perhaps be broadly characterised as one of advancing dementia, though at times patients improve very much at this period; whilst the third is the final stage of complete fatuity, during which the patient is quite helpless, and for the most part confined to bed. This is but a rough classification; the primary stage of exaltation is often absent; and there is no uniformity in any two cases, as regards the duration of the stages: nevertheless we have thought it well to include it, as giving at least a general idea of the period in

each case at which the examinations were made. (It may perhaps be advisable to note that this division is not quite the same as that adopted by some authorities, who call the first stage, that of commencing mental alienation, prior to the advent of excitement, but the classification we have chosen we think preferable for the purpose.)

In 10 of the 66 cases the optic nerves and discs have been submitted to microscopical examination; the cases examined are indicated in the table, the details being given in the text.

It will be seen that four abnormal conditions of the optic discs have been met with. (1) Simple hyperæmia. (2) The same, combined with some amount of softening or blurring of the edges, the extent of this being never very great. (3) Simple anæmia. (4) Distinct atrophy. These are not however distinct conditions, but more or less different stages in one process, or we would rather say two, for we feel pretty confident that complete atrophy of the discs may occur without a previous stage of hyperæmia.

The cases in which decided hyperæmia of the discs occurred with more or less blurring of the edges are Nos. 3, 21, 34, 42, 13. In No. 3 the abnormal redness, &c., came on whilst the patient was under observation, and a microscopical examination of the parts involved was made after death, which took place two months after the last ophthalmoscopic examination.

In a transverse section of the optic nerve immediately behind the eyeball it was found that the trabeculæ, or fibrous septa between the nerve bundles, were thickened, in some parts decidedly so, in others scarcely at all: the neuroglia corpuscles were distinctly hypertrophied, sending out branching processes interlacing with each other; they also appeared more numerous than usual: these conditions were not uniform—some parts appearing healthy or nearly so. The nerve tubules seemed everywhere quite healthy. The conditions in fact were similar to, but less advanced than, those observed in case No. 42 (described below).

In No. 21 the discs when first examined were abnormally red, but this had subsided 2½ months afterwards, and these parts then appeared normal.

In No. 34 the discs remained in the hyperæmic con-

dition during the six months patient was under observation, though the redness was subsiding when the last examination was made.

No. 42 was a good example of the process in question: the hyperæmia distinctly increased during the eight months the patient was under examination, and the edges of the discs were seen to become very misty and at length difficult to distinguish; the patient died two months after the last examination, of pneumonia, and a microscopical examination of the optic nerves and discs was made. It was found that the inner sheath of the nerve was scarcely at all thickened; but the trabeculæ were everywhere enlarged—in some parts very greatly so—the contained nuclei being very distinct; the neuroglia corpuscles were much hypertrophied, and their processes so numerous and distinct, that in many of the nerve bundles a distinct network of them could be traced with great facility; they appeared also to be increased in number. There was an absence of small cell infiltration in the nerve, but there appeared to be a little in the course of the fibres on the disc. The nerve tubules everywhere appeared quite healthy. (Plate II. Fig. 6.)

We wish particularly to refer to No. 13, which we think very interesting and important. This case was under observation 20½ months, and the process was watched through all its stages, from commencing hyperæmia, to distinct atrophy. On the first examination, there was a suspicion of abnormal redness of the discs; on the second (two months later) distinct evidence of slight neuritis was found; this remained stationary for about a month, and indeed underwent very little change for another six months, though the redness seemed to be very slowly subsiding; at the end of 13½ months from the first examination, the right disc had become distinctly paler though the left continued red, whilst in another three months there was a still further diminution of colour in each disc; in another four months (20½ months from first examination) the right disc had become distinctly atrophic, whilst the left still retained colour, though this was fast subsiding.

We thus had here an opportunity of watching through its whole course a process which more often comes under

observation at isolated stages, and though the inference that the process described occurred might have been legitimately drawn from the observance of the discs, at these isolated stages, the case just quoted furnishes an exemplification of this, as complete as could be desired. We should be disposed to style the process a slight neuritis,[1] running a very chronic course. A microscopical examination of the optic nerves was made in this case. The internal sheath of the nerves was moderately, but not greatly thickened; the trabeculæ were generally thickened, in some places very greatly so, and presented for the most part a translucent, imperfectly fibrillated appearance; in the centre of the thickest parts, enlarged arteries could in most cases be distinguished; the neuroglia corpuscles were increased in number, and to a certain extent in size, but there was no distinct small cell infiltration; in a few parts, what with the thickening of the neuroglia and the great development of the trabeculæ, the nerve bundles appeared almost obliterated, and in some of the sections a distinct band of fibrous tissue ran from the periphery inwards, in which but slight evidence of nerve bundles could be found; the fibrous thickening was thus much more advanced in some parts than in others. The nerve bundles appeared everywhere to have undergone degeneration, their position being occupied by granular-looking masses, in which normal nerve tubules could not be distinguished. The nerves as a whole were much diminished in size. (Plate I., Figs. 2 and 3.)

It seems worthy of note that in two (Nos. 3 and 13) of these five cases in which evidence of slight neuritis was found, well-marked pachymeningitis of the cerebral dura mater extending quite down to base was disclosed at the autopsy; in two other cases however (Nos. 21 and 42) this condition did not exist; whilst in the other case (No. 34), no opportunity was afforded of ascertaining this point.

But whilst atrophy of the discs may thus succeed a process which can only be described as a slight chronic interstitial neuritis, we have also evidence that it may independently occur; but we must first notice a condition of anæmia of the discs of

[1] This term is perhaps not free from objection, but the process appears to be a chronic interstitial inflammation,—a cirrhosis, in fact.

which Nos. 18 and 38 are examples. No. 18 was under observation for eight months; the pallor of the discs came on under observation, and was so great as to suggest atrophy; nevertheless this patient's acuteness of vision was perfect. We have before given it as our opinion, that if a patient can read J 1 and $\frac{20}{20}$ he has not as yet got atrophy, whatever he may be going to have. In the case before us, the pallor showed a tendency to diminish rather than to increase; we were not able to trace its subsequent progress owing to the patient's removal from the asylum, and hence, although the case may not improbably have ended as one of atrophy, we have no proof that it did so. No. 38 was another case in point, though here we had no opportunity of comparing the appearances presented by the discs with a previously normal state.

We have marked as distinct cases of atrophy, Nos. 28, 44, 45, 53, and 59.

In No. 45 the appearance of the right disc was strongly suggestive of commencing atrophy. This patient had the clinical signs of sclerosis of lateral columns of cord.

The other four cases were well-marked examples, and two of the patients (Nos. 28 and 59) were quite blind. No. 28 was a very interesting case. The patient apparently completely recovered from the first stage of the disease (as to the diagnosis of which there was at this time a little doubt), and was discharged from the asylum; it happened that an ophthalmoscopic examination had been made, and nothing abnormal detected; nine and a-half months after the patient's discharge (about 14 months after the ophthalmoscopic examination) she was brought to the asylum by her husband, with the complaint that her eyesight was very bad, and had been failing since about a few weeks after her return home; both optic discs were then in an advanced condition of grey atrophy, and patient was nearly blind; her mental faculties were also clearly failing—she was in fact becoming demented. She was re-admitted into the asylum about 4 months subsequently, when the appearances presented by the optic discs were substantially the same, as they were also noted to be at the last examination, when patient was well advanced in the third stage of the disease.

A microscopical examination of the optic nerves and discs was made. It was found that the internal sheath of the nerve was very greatly thickened; the trabeculæ were also decidedly thickened and approximated to each other, forming in many places wavy bundles of fibrous tissue, the nuclear elements in these bundles being in many places very prominent. The neuroglia corpuscles were increased in number apparently, but not notably in size, whilst there was a general infiltration throughout the nerve bundles of small cells. The nerve bundles were much obscured by the thickened trabeculæ, and nuclear elements, and had clearly undergone considerable wasting, but could in most places be distinguished by careful examination. The nerve as a whole was much diminished in size. The transverse section above described, from this case, presented considerable difference as compared with that from No. 13; the chief points of contrast being that the internal sheath was more thickened, and the rabeculæ somewhat less so in the present case than in No. 13; the nerve bundles appeared also less degenerated in the former than in the latter, though possibly post-mortem changes may have been a factor in this; the nuclear elements throughout the section were also much more numerous in the case last described than in No. 13. (Plate II. Figs. 4 and 5.)

In No. 44 the atrophy, though not so extreme, was yet far advanced. This case had the clinical signs of locomotor ataxy; and after death grey degeneration of the posterior columns of the cord was found throughout the greater portion of their length.

No. 53 is still under observation; the first examination was made when patient was yet in the first stage of the disease, and well-marked atrophy was noted then, without any trace of hyperæmia; the atrophic condition appears to have been steadily advancing.

No. 59 is also still in the asylum; he is quite blind, and complete atrophy of his discs was found when he was first examined; the patient was however at that time well advanced in the second stage of the disease, and the appearances of the discs were quite consistent with the former presence of neuritis; in fact they rather suggested such an origin.

This patient has well-marked signs of sclerosis of lateral columns of cord.

As regards the question of a relation between spinal symptoms and optic nerve atrophy in General Paralysis, our cases furnish both positive and negative information. Of the five cases of optic nerve atrophy which we have described, one (No. 44) had posterior sclerosis, and two others (Nos. 45 and 59) signs of lateral sclerosis. In No. 28, on the other hand, than which no case could have been more typical, not only were spinal symptoms absent during life, but from a careful microscopical examination of the cord, we are able to declare that it was perfectly healthy, sections taken from the cervical, dorsal, and lumbar regions, presenting perfectly normal characters. In No. 53, the knee jerks are normal, and there is no ankle-clonus. On the other hand, No. 66 has signs of lateral sclerosis, while the discs are described as normal.

We think that in at least three of these cases, Nos. 28, 44, and 53, the atrophy was primary, that is, was not preceded by any prior stage of hyperæmia at the disc, but the patients not having been under close observation previously, it is doubtless impossible to affirm this absolutely. It may, however, be remembered that in No. 28 a previous examination had been made, though sufficient time had probably elapsed between this examination and the second, for a neuritis to have set in and run its course. In No. 53 again the discs were distinctly atrophic whilst the patient was yet in the first stage of the disease; in connection with which point it is not unimportant to observe, that those cases of slight neuritis which have come under our notice have run a very chronic course, remaining for months practically unchanged.

We ground our opinion, however, quite as much on the appearances presented by the discs at the time of examination, which were such as strongly to suggest that the changes were primary. The atrophy then would in all probability be due to destruction of nerve fibres by a chronic inflammatory process (similar to that we have noted at the discs in other cases) occurring higher up—in the intracranial course of the optic nerves—in the optic tracts—or even at the nuclei of

origin; the nerve tubules below the seat of disease subsequently wasting.

In connection with this point it may be stated that in No. 28 the corpora geniculata had altogether disappeared, the corpora quadrigemina appearing normal to the naked eye.

The cases we have marked as doubtful are Nos. 1, 2, 22, 39 43, 48, 51, and 60. We think it very possible that some at least of these cases were abnormal; in Nos. 39 and 60, for, instance, the redness noted may not improbably have been the commencing hyperæmia of the neuritis previously described; whilst, on the other hand, in No. 43 the pallor may have been that of commencing atrophy; the changes being however so slight, we have preferred not to pronounce positively upon them. We may mention, however, that in No. 1 the blurring of the inner edges of the discs was probably a physiological condition, that was at least the impression conveyed by the appearance of the discs, which were perfectly normal in all other respects, and the condition in question has remained absolutely unchanged for $2\frac{1}{4}$ years.

It is unnecessary to comment upon the remaining cases which we have pronounced to be normal, except in the case of those, six in number, in which a microscopical examination of the optic nerves,[1] &c., was made after death.

No. 12. The last ophthalmoscopic examination was made $2\frac{1}{2}$ months before death, the patient being at the termination of the second stage of the disease, which had lasted about six years.

The nerve tubules were healthy; the trabeculæ were not thickened, but the nuclei in them were unusually distinct, and there was a very slight increase in the number of neuroglia corpuscles.

No. 23. The last ophthalmoscopic examination was made three weeks before death, the patient being in the third stage of the disease, which had lasted upwards of $3\frac{1}{2}$ years.

The optic nerves were perfectly healthy. (Plate I. Fig. 1.)

No. 24. Examination made two months before death, patient being in the third stage of the disease.

[1] Sections in all cases taken close behind the eye-ball.

Optic nerves normal.

No. 27. Examination made a few hours before death, the patient being accidentally suffocated by food getting into his larynx, whilst yet in the second stage of the disease.

There was found a slight increase in the number of neuroglia corpuscles, with perhaps slight thickening of the septa here and there, but the nerves were otherwise normal.

No. 33. Examination one week before death.

Nerves for the most part quite normal, but in one or two places the trabeculæ appeared a trifle thick, and here also there was some slight increase in the number of neuroglia corpuscles.

No. 40. Examination made $3\frac{1}{2}$ months before death.

Nerves for the most part perfectly normal, but septa perhaps a trifle thick in one or two places.

It will thus be seen that in some of the clinically normal cases there was found after death a tendency to increase on the part of the fibrous elements of the nerve, manifested by slight thickening of the septa, and slight increase in the number of the neuroglia corpuscles; the changes in question however were in all cases quite trivial.

By a perusal of the microscopical reports, particularly of course those of the abnormal cases, it will be seen that the pathological process is essentially one of increase in the fibrous elements of the nerve, at the expense of the nerve tubules; in cases Nos. 3 and 42, where the process was examined in its early stages, a luxuriant overgrowth of the neuroglia elements was found, with thickening of the fibrous tissue framework, the nerve tubules being as yet perfectly healthy, whilst No. 13 presented us with a late condition in which the nervous elements had given way before the advance of the more lowly organised ones. Nor is it uninstructive to contrast these cases with those clinically normal ones, in which trivial changes were noted—changes however clearly tending in the same direction, though destined to remain in this very incipient stage; the changes indeed in these cases would very probably have remained in this incipient condition however long the patients had lived, though some might perhaps have advanced had sufficient time been allowed them.

In cases of primary atrophy such as No. 28, the pathological condition reached is eventually substantially similar, though here perhaps the sequence of changes may possibly be reversed at the distal extremity of the nerve.

As before mentioned, in the appended table details are given of all the cases examined. We do not think that there is any point in this, which calls for explanation, that has not before been commented on. As regards the refraction it will be seen, that there were eight cases of Hypermetropia and one of Hypermetropic Astigmatism; seven of Myopia, and two of Myopic Astigmatism; whilst the remaining 48 were either emmetropic, or the state of the refraction has not been recorded, in which latter case, the patients were in all probability emmetropic.

Though not strictly coming under the head of conditions of the fundus oculi, we have added a column for the state of the pupils, which have been recorded in nearly all the cases; we do so in order to emphasise the fact—not, we think, sufficiently known in this country—that there is a great tendency for the pupils in general paralysis to be inactive to light, whilst retaining their normal movement with accommodation—that is, to approach the Argyll-Robertson pupil, so common in locomotor ataxy. There is, however, as will be seen, much variation in this respect.[1]

Mania.—Taking all varieties of mania together, we have examined 82 cases: 6 of these cases were examined twice, and 1 three times, making a total of 90 separate examinations. Fifteen of these cases were males, and 67, females; the average age of the patients was 37·81 years.

Of these 82 cases, in 70 (85·36 per cent.) the optic discs and main retinal vessels were perfectly normal, whilst in 12 (14·63 per cent.) the condition of these parts was either abnormal or doubtful; that is, in these latter (doubtful) cases, the changes were so slight that no decided opinion as to their abnormality could be formed.

Taking the cases more in detail, we find that out of 34 described as "acute," 30 were normal, and 4 abnormal, or

[1] For a paper on the condition of the pupils, &c., in "General Paralysis," &c., see Bevan Lewis, in vol. iii. of Ophthalmological Society's Transactions.

doubtful; out of 7 cases of "puerperal" mania, 2 were normal, and 5 abnormal or doubtful; whilst out of 26 cases of chronic mania, only 2 were described as abnormal or doubtful, and out of the 15 cases of the delusional form of mania only one, all the others being perfectly normal.

We append a table showing the condition of the optic discs, &c.; in these 12 abnormal or doubtful cases, upon which a few remarks may be made. (1) The changes are exceedingly trivial or inconsequential.

In No. 1, the discs were almost certainly normal; in No. 3, an old syphilitic choroiditis accounted for the majority of the changes noted; in No. 5, the only abnormality was that the veins were too full, but as in a subsequent examination this undue fulness had subsided, we have thought it advisable to include the case; in No. 10, the high degree of myopia was responsible for almost all the changes noted, though the appearance of atrophy in the right disc may have been independent. We have preferred to give these cases in full, in order that the reader may form his own conclusions upon them, but we are decidedly of opinion that some at least of the cases are normal.

2. It is, perhaps, worthy of note that almost all the changes noted, such as they are, are in the direction of abnormal redness of the disc; but in this connection we must not lose sight of the fact, that it is often as difficult to tell where the physiological limit of tint ends and the pathological begins, in the case of redness as in that of pallor.

3. The table brings out clearly the numerical preponderance of changes in the acute cases over the chronic.

Some further remarks are requisite with reference mainly to some of the normal cases. One of the cases was examined twice in the course of the acute attack, and another three times, but the discs presented precisely the same appearances at each examination.

We were able to secure a good view of the discs in 3 cases *during an acute maniacal paroxysm;* in one of these cases the discs were thought to be too red, and this case is included under the abnormal ones in the table (No. 9); in the 2 other cases the discs were noted to be perfectly normal; in one of these, however, it was only possible to make an indirect ex-

amination, whilst in the other the left disc only was examined, but a thoroughly good view of it was obtained by the direct method.

We have examined 3 cases shortly (1 to 3 or 4 days) after the subsidence of a maniacal paroxysm; in these the discs presented perfectly normal characters, no abnormal redness or pink suffusion being noted.

In 4 cases the condition of the discs was noted in the same patient, during the maniacal attack, and after convalescence; in one of these, which is included in the table of abnormal cases (No. 5), an undue fulness of veins was noted during the attack, which was not present when the patient was convalescent; in the 3 other cases the discs presented precisely the same appearances at each examination.

In a few of the 70 cases in which the optic discs and vessels were normal, some changes in the choroid were found. In one of these there was evidence of old choroiditis; in one, large posterior staphylomata, and in two others, small ones, due to the presence of myopia; whilst in one other small crescents were noted without any myopia; in another case again there was slight choroidal atrophy all round the discs, and in 3 others a little pigmentary disturbance of the choroid around or on one side.

In one case there was a detachment of the retina in the right eye. We have thought it well just to mention these points, but consider they have no bearing upon the subject of our paper, for though we have included one or two such in our table of abnormal cases, this has been simply because the changes in the choroid were here associated with others in the discs, which latter were possibly independent of the former.

Melancholia.—In all, 49 melancholiacs have been examined, 8 of these were males, and 41 females. The average age of the patients was 38·93 years. In 40 of these cases (81·63 per cent.) the optic discs and main vessels were absolutely normal, whilst in the remaining 9 cases (18·36 per cent.) slight changes were found. More in detail; out of 7 cases of active recent melancholia, 5 were normal, and 2 abnormal or doubtful; out of 32 cases of the passive recent form, 27 were

normal, and 5 abnormal or doubtful; whilst out of 10 cases of the passive variety which had become chronic, only 2 were in the latter category.

We consider that some of the changes noted are of very doubtful abnormality, but we have preferred (as in the case of mania) to give the cases in detail, in order that any one may be able to form his own opinions on the subject.

We may, however, remark concerning some of the cases in the table, that No. 2 was very probably quite normal; in No. 4, the only abnormality noted was that the vessels were rather small; in No. 3, the appearances of atrophy were most probably due to the patient's alcoholic excesses, which were almost certainly responsible for her insanity; whilst in No. 6, the changes noted were due to the presence of chronic Bright's disease.

We may just add, that in the 40 normal cases there were 2 in which choroidal atrophy was present round the discs, in one of which it took the form of a small crescent; in 2 other cases there were pigmentary deposits round the discs; whilst in yet 2 others a few small white spots were noted in the retina, due in one of these cases to chronic Bright's disease.

Mental stupor.—Two cases of mental stupor were examined, both during the attack and after convalescence; the condition of the discs is given in full in Table IV.; it would seem from the descriptions that the discs were perhaps slightly more pale during the condition of stupor than when the patients were convalescent, but the difference was so slight that we think it would not be safe to draw any conclusions.

Dementia.—We have examined in all 61 cases of dementia, 7 of these were males, and 54 females; the average age of the patients was 46·80 years. Of these 61 cases, in 46 (75·40 per cent.) the optic discs, &c., were perfectly normal; whilst in the remaining 15 (24·59 per cent.) these parts presented some degree—either slight or considerable—of departure from the normal, the changes in some cases being so slight that no decided opinion as to their abnormality could be formed.

Examining the cases more in detail we find that out of 41 cases of dementia, secondary to mania, 33 were normal, and 8 were abnormal or doubtful; whilst out of 8 cases of

primary dementia, 5 were in the former, and 3 in the latter category; of organic dementia again, out of 8 cases, 6 were normal, and 2 abnormal or doubtful; only 4 cases of senile dementia were examined, 2 of which were normal, and 2 the reverse.

As in previous cases, we append a table giving in detail the conditions noted in the 15 abnormal or doubtful cases.

It will be observed that in the majority of the cases given in the table, the changes were in the direction of abnormal redness; but the same remark applies here that we made in the case of mania, as to the difficulty there often is in defining the physiological limit of colour, and probably some of the cases included in the table were normal. In Nos. 7 and 12, the changes described were doubtless altogether due to the Bright's disease from which the patients suffered.

In 3 of the 46 normal cases, considerable posterior staphylomata were present, due to myopia; whilst in one other there was a small crescent without any abnormality of refraction being detected. In another case there was an irregular patch of choroiditis round each disc, whilst in 3 others there was more or less pigmentary disturbance of the choroid in this situation.

Epilepsy.—Of insanity associated with epilepsy we have examined 48 cases; 8 of these were males, and 40 females; the average age of the patients was 33·20 years.

Taking all the 48 cases together, in 41 (85·41 per cent.) the optic discs and main retinal vessels were perfectly normal; whilst in 7 (14·58 per cent.) these parts were either abnormal or doubtful.

Of epilepsy associated with imbecility 20 cases were examined, 15 of which were normal, and 5 abnormal or doubtful. Of epilepsy, with slight impairment of the mental faculties, 20 cases were examined, only one of which showed any departure from the normal, and that very slight; whilst of the cases of epilepsy combined with considerable dementia, only one case out of 8 showed any tendency to abnormality, and here again the change was very trivial. As in other cases we append a table, showing the condition of the optic discs in the 7 abnormal (or doubtful) cases, from which it will be seen that the changes, such as they are, are very slight, and are

chiefly in the direction of abnormal (or doubtfully abnormal) redness. Choroidal disturbances were noted in 5 of the 41 normal cases; 2 of these were merely myopic crescents; in one there was a zone of choroidal atrophy round the discs, and in one other some slight progressive choroiditis in the same situation, associated with chronic Bright's disease; while in yet another case there was slight pigmentary disturbance of the choroid around the discs.

It is perhaps worth a note, that out of the 48 cases no fewer than 20 presented errors of refraction; of these 12 were hypermetropic, and 2 had hypermetropic astigmatism; 2 were myopic, and the other 4 had myopic astigmatism.

A few observations were made with reference to the condition of the discs and retinal circulation before and after the occurrence of fits.

In one case a fit came on whilst the disc was under observation, but it was unfortunately impossible to keep this in view during the progress of the attack; immediately afterwards, however, the disc was thought to present a distinctly pink tinge, as compared with its condition just prior to the attack, when it was very pale.

One case was examined some hours after a series of 35 fits, but no abnormality was detected. In another case, a good view was obtained by the direct method immediately after a fit, which was one of a series of status epilepticus, comprising something like 60; the disc was normal, of a red tint, with well-defined edges; the veins were full, but could not be described as abnormally distended; these characters remained constant during an observation of about 20 minutes.

We may mention in this connection, that in the case of a general paralytic (No. 33 in Table 1), who died after a series of convulsions, a view of the left disc was obtained by the indirect method just as a severe fit was passing off; the veins then appeared distinctly distended; a good view was subsequently obtained by the direct method and maintained for some minutes; the discs and vessels then appeared normal, though the blood in one of the main veins was perhaps a little darker than usual.

Imbecility.—Five cases of imbecility have been examined,

not complicated with epilepsy; 3 of these were males, and 2 females; the average age of the patients was 22–80 years.

The discs were perfectly normal in every case.

Taking again the whole series of cases examined, one or two further remarks have to be made.

A point of some little interest which forced itself upon our attention, was the number of cataracts we came across; including all cases (slight and considerable) of opacities and striæ in the lenses, we noted that 43 out of the 313 cases were so affected—a proportion of 13·73 per cent. The average age of the patients was 54·72 years. We are not acquainted with any statistics bearing on this subject, but we should think that this was a much higher percentage than occurs in the population at large of the same average age. If this supposition be well founded, it would furnish another interesting exemplification of the general impairment of nutrition, so common in the insane.

We think it just worth mentioning, that out of the 313 cases we met with 4 in which the condition known as "opaque nerve fibres" existed in connection with the disc; the extent to which this occurred varied considerably in the 4 cases, and was in none of them very extensive; the condition, as is well known, has no pathological significance.

It is also perhaps worth a note, that in not a few cases we met with tortuosity of the vessels, this condition being extreme in the person of one man suffering from the delusional form of insanity. We mention this as some observers appear to have attached weight to the circumstance; but in our own cases we feel confident that the condition was purely physiological, our experience furnishing us with numerous similar cases, in persons other than lunatics, in which it was not legitimate to invoke a pathological origin.

Only two cases of retinitis pigmentosa were met with, and both these occurred in the persons of female General Paralytics, and have already been referred to; in one case the changes were confined to one eye.

It would be foreign to the purpose of this communication to examine in detail all the previously published observations on

this subject, even had we the material before us to enable us to do so. In Dr. Gowers' valuable work on the ophthalmoscope, references are given to some of the Continental publications on the subject, and the striking discrepancies between the observations of different observers is commented on. We will content ourselves therefore with some remarks on the observations which have been published in this country.

First then, as regards General Paralysis.

To Dr. Clifford Allbutt belongs the credit of being the first —in this country at least—to break ground on the subject, and his observations, first published in the 51st volume of the Medico-Chirurgical Transactions, are now to be found incorporated with his work on the ophthalmoscope.

Of 53 cases of General Paralysis examined, Dr. Allbutt only found 5 that were healthy; of the remaining 48 he found "atrophy of the optic discs in its various stages in 41 cases," and 7 cases were marked as doubtful; and the conclusion drawn was "that atrophy of the optic nerves takes place in almost every case of General Paralysis."

This conclusion is not in accordance with the results of our own observations.

On going carefully through the cases given in detail in Dr. Allbutt's tables, we find amongst the 41 cases, 4, in which pure hyperæmia was present, without the slightest appearance of atrophy whilst the case was under observation; in 14 others, some amount of atrophy was combined with the appearances of congestion, or these latter had been noted at some previous examination; the remainder must therefore be intended for cases of pure atrophy. After a careful perusal of the descriptions however, we are unable to reconcile some of these with the conclusions drawn from them; at the least, we should say that some of them were of very doubtful abnormality. We note also that three cases of "Amaurosis" are given, without any mention being made of the appearance of the discs, which we therefore presume were not examined; we cannot, however, consider that to include these cases under the head of "atrophy" is altogether satisfactory, seeing how many misleading factors come into play in a demented General Paralytic, in the third stage of the disease.

We may also mention that in the case numbered 31 in Dr. Allbutt's tables, the atrophy of the left disc is at least as likely to have been due to the syphilitic choroiditis with which it was associated, as to have had an independent origin. Making every allowance for doubtful cases however, the percentage of abnormal cases in Dr. Allbutt's tables is very much higher than that which we have ourselves experienced. As regards the nature of the lesion however, in the abnormal cases, we are quite in harmony with Dr. Allbutt, the changes noted by us being clearly practically identical with those so well described by that observer.

In Vol. II. of the West Riding Asylum Reports (1872), will be found a paper by Mr. Aldridge, entitled "Ophthalmoscopic Observations in General Paralysis." Mr. Aldridge examined 43 cases, the details of which are given in his tables. Though the author does not distinctly state that all his cases were abnormal, he leaves it to be inferred that they were so; for on p. 225 of the work referred to, he states that "only two conditions of the optic nerve were observed," and then goes on to describe these conditions, as those of neuritis and atrophy; whilst on p. 227 he distinctly states that atrophy was present in greater or less degree in all the female patients (13 in number) that he examined.

Here again we note agreement as regards the nature of the change with the prior observations of Dr. Allbutt and those now published by ourselves. The numerical proportion of abnormalities, however, detected by Mr. Aldridge, being so greatly in excess of anything we have observed, we cannot resist the suspicion that some error has crept in to vitiate his conclusions; nor indeed is internal evidence of this wanting; for on p. 226 of the work before us, we read: "The disease generally ends by one side of the disc, usually the inner, becoming white and atrophic, whilst the inflammatory changes are still in progress at the other. *In some cases again another course seems to have been taken, for in them we find that the disc has a white rim, and that a very large and shallow excavation of an extremely pearly white tint occupies the centre, the remaining portion being said to be of a greyish-pink tinge.*"

The italics are our own, and we emphasise this passage

because we recognize in it a good description of a perfectly normal disc, with well-marked physiological cup.

We cannot indeed resist the conclusion, that this physiological cup (which, as is well known, varies greatly in size) has had to do duty for atrophy in not a few cases.

Space will not permit of a critical analysis of all the cases, but we may mention Nos. 25, (in which "atrophic changes were noticed," p. 228) 26, 27, 29, and 32, as instances in point: thus, of No. 29 it is stated: "Right eye: O.D., well defined by a narrow white rim of medium red tint, and having central bright white spot. Left eye: O.D., well-defined, very narrow white rim, it also has a small central white spot, the rest being of a medium pink glow."

As regards the main vessels, Mr. Aldridge leaves it to be inferred from his descriptions that in not a single case were these of normal calibre.

On the subject of General Paralysis, Dr. Gowers says,[1] "Most of the cases I have examined in various stages of the disease, presented perfectly normal conditions. In one case only was there the appearance of simple congestion of the disc."

Nettleship (quoted by Gowers) has recorded[2] an interesting case, in which optic nerve atrophy preceded the symptoms of General Paralysis.

A more recent observer, Dr. Lawford, has described (Transactions of Ophthalmological Society, vol. iii. p. 221), 7 cases of optic nerve atrophy in General Paralysis; it is not, however, stated from what proportion of cases these results were obtained, but only that 3 of the number were found in an examination of 22 cases of the disease.

It is interesting to note, in connection with the question of a relation between optic nerve atrophy and spinal symptoms in General Paralysis, that 5 out of these 7 cases had spinal symptoms, one posterior sclerotic, and 4 lateral sclerotic.

As regards insanity other than that associated with General Paralysis, the most important observations made in this country, so far as we are aware, are those by Dr. Clifford

[1] 'Medical Ophthalmoscopy,' 2nd edition, p. 178.

[2] 'Ophthalmic Hospital Reports,' vol ix., p. 178.

Allbutt, which are to be found in his work on the ophthalmoscope. Speaking broadly, we may say that Dr. Allbutt found a much larger proportion of changes than we have ourselves noted. Space will not permit of our analysing the cases in detail, nor indeed is it necessary to do this, as Mania is the only form of insanity with which an attempt has been made by the author to associate a definite change in the fundus oculi. We will briefly examine the main conclusions drawn in this case. Dr. Allbutt states, "that both in mania depending upon organic causes and in functional mania, the back of the eye if observed within a few days after a paroxysm, presents a vascular suffusion or pinkiness, so great after severe paroxysms as to obscure the discs." We regret that our attention was not forcibly directed to this statement at a sufficiently early period of our investigation to have examined it with the attention it deserves; so far, however, as our cases go they do not support the conclusion, for by a reference to what we have written under the head of Mania, it will be seen that we have examined three cases with reference to this point, in none of which was any abnormality detected. Dr. Allbutt further states "that during the paroxysm, on the contrary, the disc is anæmic, perhaps from spasm of the vessels;" this conclusion is, however, founded upon one observation only, and our own cases do not support it, for it will be remembered that we examined three cases during an acute maniacal paroxysm, in two of which the discs were perfectly normal, whilst in the third the changes noted were in the direction of abnormal redness, rather than of abnormal pallor.

In Acute Dementia, Mr. Aldridge found "a state of retinal anæmia,"[1] and adds "the optic discs are pale." In most of our own cases the discs were normal; in one only did we note "tint inclining to pale, arteries rather small;" whilst in another case the discs were "very red." (See Table V., Nos. 9 and 10.)

In Epilepsy Mr. Aldridge states,[2] as the result of an examina-

[1] 'Ophthalmoscopic Observations in Acute Dementia,' West Riding Asylum Reports, vol. iv. (1874), p. 296.

[2] 'The Ophthalmoscope in Mental and Cerebral Disease,' West Riding Asylum Reports, vol. i., p. 87.

tion of 102 cases, that "in a great majority of them a condition of hyperæmia of the retina and optic discs was found." As will have been seen, our own observations gave altogether different results.

Conclusions.—In all questions dealing with the condition of the fundus oculi in insane patients, it is necessary to draw a clear line of distinction between the disease known as General Paralysis of the Insane, and other forms of insanity. With this proviso we venture to draw the following conclusions:

1. That in Insanity proper (including all forms other than General Paralysis) changes in the fundus oculi are found in a small minority of cases; but that when allowance is made for changes depending upon associated constitutional conditions, errors of refraction, &c., the number of cases in which a connection between the mental (cerebral) state, and the accompanying change in the fundus oculi, can be so much as suspected, is very small.

As a corollary from this we may say,

2. That in Insanity proper no connection can be traced between the condition of the fundus oculi and the patient's mental state.

3. That in the majority of cases of "General Paralysis of the Insane," the fundus oculi presents a perfectly healthy appearance.

4. That in a minority of cases clear and precise lesions are found.

5. That these lesions fall into two main classes, the one tending in the direction of slight neuritis, the other in that of atrophy.

6. That in the former class the affection declares itself as a hyperæmia of the discs, the edges being softened and indistinct, so that in some cases they can be traced with difficulty or not at all; and that these conditions tend—if the patient live long enough—to be replaced by atrophy, so that at length complete disorganisation of the nerve may take place. The changes are essentially chronic in their course.

7. That though atrophy of the optic nerves may thus succeed to a slight chronic interstitial neuritis, it is also not un-

frequently primary *at the disc;* the atrophy may be complete, the patient becoming quite blind.

8. That the pathological basis underlying the appearances of slight neuritis, may be broadly characterised as a tendency to overgrowth in the connective elements of the nerve; the trabeculæ not only getting greatly hypertrophied, but the neuroglia corpuscles also becoming very large and numerous; these parts thus grow at the expense of the nervous elements, which subsequently atrophy.

9. That in the cases of primary atrophy, the pathological appearances eventually reached, though somewhat similar, may possibly take place in the reverse order *at the disc*; the nerve fibres being the first to dwindle, and the fibrous elements—trabeculæ &c., subsequently taking on increased growth.

10. That in a considerable proportion of the cases in which atrophy of the optic discs is met with, spinal symptoms are prominent in the disease, these symptoms pointing in the direction of posterior or lateral sclerosis of the cord; but that this connection is by no means invariable.

TABLE I.—Showing the Condition of the Eye in

No.	Initials of Patient.	Sex.	Age.	Stage of Disease.	Dates of Examinations.	Condition of Fundus, &c.
1	E. McM.	F.	24	1st	'81, Oct. 29	Blurring of inner edge of each disc (m marked in left).
				2nd	'82, Mar. 22	Same condition.
				„	„ Nov. 4	„ „
				„	'84, Feb. 2	Condition absolutely unchanged.
2	H. B.	F.	44	1st	'81, Nov. 7	Both discs normal; arteries very small, a few in number.
				„	'82, Mar. 15	Both discs pale.
				„	„ „ 29	„ „
				2nd	„ June 10	„ „
				3rd	'83, Jan. 25	„ „
3	A. B.	F.	56	2nd	'81, Nov. 2	Both discs perfectly normal.
				„	'82, Mar. 15	„ „ „ (pink).
				„	„ Sept. 14	Both discs very red, nearly the colour of t fundus; redness invades centres; margi of left disc decidedly blurred.
				„	„ Nov. 23	Same condition.
4	A. R.	F.	38	1st	'81, Nov. 2	Both discs perfectly normal (red). Large st phylomata around each, developed chie to inner sides.
				„	'82, Mar. 15	Same condition.
				„	„ „ 29	„ „
				2nd	'84, Feb. 2	„ „
5	A. W.	M.	42	2nd	'81, Nov. 5	Both discs perfectly normal.*
6	E. L.	F.	33	2nd	'81, Oct. 16	Both discs perfectly normal. (Indirect e amination only.)
7	T. C.	M.	41	2nd	'81, Nov. 9	Both discs perfectly normal.
				„	'82, Mar. 11	Same condition.
8	J. O.	M.	37	2nd	'81, Nov. 10	Both discs perfectly normal. (Peripher striæ in both lenses.)
				„	'82, Mar. 11	Same condition.
9	T. P.	M.	32	2nd	'81, Nov. 10	Right disc perfectly normal. (Left eye- opaque capsule.)
				„	'82, Mar. 11	Right disc perfectly normal.
				„	'84, Feb. 20	„ „ „
10	J. C.	M.	43	2nd	'81, Nov. 10	Both discs perfectly normal. Numerous sma pigment spots in right retina.
				„	'82, Mar. 11	Same condition.
11	F. W. T.	M.	43	2nd	'81, Dec. 17	Both discs perfectly normal. A small patc of choroidal atrophy in vicinity of rigl macula.
					'83, Jan. 5	Same condition.
12	E. D.	F.	21	2nd	'81, Dec. 7	Both discs perfectly normal. (No staphy lomata.)
13	C. B.	F.	42	1st	'81, Dec. 3	Both discs decidedly red, the area of greate redness being a middle zone between centr and margins, which are pale.
				„	'82, Feb. 1	Both discs very red, almost the colour of th

* In this and all other cases where no special reference is made to the conditi

IXTY-SIX CASES OF GENERAL PARALYSIS OF THE INSANE.

Refraction of Eyes.	Acuteness of Vision.	Condition of Pupils.	Termination of Case.	Remarks.
R. + 3 D. L. + 2 D.	R. $\frac{20}{40}$ J. 1 L. $\frac{20}{30}$ J. 1	3½ mm. equal, regular; act well to light and to accommodation.	Still under observation.	The blurring of inner edge of each disc is probably a physiological condition.
Emmetropic	..	R. 5 mm., L. 3. regular; very little action either to light or to accommodation.	Died, '83, July 26.	Had aortic regurgitation.
R. + 1 D. L. + 1 D.	R. $\frac{20}{40}$ J. 16 L. $\frac{20}{30}$ J. 16	R. 3 mm., L. 4 mm., both regular; sluggish to light, but act to accommodation.	Died, '83, Jan. 20.	Died of phthisis. Microscopical examination of optic nerves, &c. Pachymeningitis of cerebral dura mater.
R. − 10 D. L. − 10 D.	R. $\frac{20}{0}$ J. 2 L. $\frac{20}{0}$ J. 2	R. 3 mm., L. 4 mm., regular; act to light and to accommodation.	Still under observation.	
..	..	.. ..	Died, '81, Nov. 30.	Died of an apoplectiform attack.
Emm.	R. $\frac{20}{20}$ J. 1 L. $\frac{20}{20}$ J. 1	Both 2½ mm., act to light, but very sluggish.	Died, '81, Oct. 31.	Died of diarrhœa.
Emm.	R. $\frac{20}{20}$ J. 1 L. $\frac{20}{30}$ J. 1	R. 3½ mm., L. 3 mm.; right very sluggish to light, left acts well; both act to accommodation.	Died, '82, Dec. 14.	
R. + 2 D. L. + 2 D.	R. $\frac{20}{40}$ J. 2 L. $\frac{20}{40}$ J. 4	Both 3 mm., regular; no action to light, but act well to accommodation.	Died, '82, Nov. 15.	
R. Emm.	R. $\frac{20}{20}$ J. 1 L. blind	R. 3½ mm., L. 3; both act to light and to accommodation.	Still under observation.	
Emm.	R. $\frac{20}{20}$ J. 6 L. $\frac{20}{20}$ J. 2	R. 3 mm., L. 2¾, regular; act fairly well to light and well to accommodation.	Died, '82, Aug. 6.	
Emm.	R. $\frac{20}{30}$ J. 4 L. $\frac{20}{30}$ J. 6	R. 3 mm., L. 3½; both act to light, but right sluggish; both act to accommodation.	Died, '83, June 5.	
. − 15 D. . − 18 D.	R. $\frac{20}{0}$ J. 1 L. $\frac{20}{0}$ J. 1	R. 5 mm.; L. 4½ mm.; scarcely any action to light; act to accommodation.	Died, '82, Feb. 18.	Microscopical examination of optic nerves.
Emm.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{20}$ J. 1	Both 2¾ mm., regular; act to light and to accommodation.	Died, '83, Oct. 17.	Microscopical examination of optic nerves, &c. Plate I. Figs. 2 and 3. Pachymeningitis of cerebral dura mater.

he main vessels, these parts presented perfectly normal characters.

TABLE I.—Showing the Condition of the Eyes

No.	Initials of Patient.	Sex.	Age.	Stage of Disease.	Dates of Examinations.	Condition of Fundus, &c.
13	C. B. *contd.*					fundus, the redness invading the physiological cups; edges decidedly blurred though not equally so everywhere; outer edge of right pretty distinct for a short distance.
				1st	'82, Mar. 1	Much the same condition.
				„	„ May 3	Discs decidedly red, but less so than on former examinations—left the redder of the two; slight haziness of margins.
				2nd	„ Sept. 1	Much the same condition, but redness somewhat less marked.
				„	'83, Jan. 25	Right disc decidedly paler, but upper zone still of a distinct pink hue; edges very slightly blurred. Left disc still abnormally red; edges slightly blurred.
				„	„ April 26	Right disc pale—not pink; edges defined. Left disc full pink, edges defined.
				3rd	„ Aug. 22	Right disc greenish-grey throughout—no pink colour—distinctly atrophic in fact; vessels not diminished in size. Left disc, pale pink.
14	W. D.	M.	49	2nd	'81, Dec. 17	Discs normal. Choroidal atrophy around each with patches of black pigment; a small recent hæmorrhage on outer margin of left; round right macula minute spots of choroidal atrophy. (Both lenses rather hazy.
15	W. P.	M.	33	2nd	'81, Dec. 17	Both discs perfectly normal.
				„	'82, Mar. 8	„ „ „
16	W. K.	M.	28	2nd	'81, Dec. 21	Discs normal. Choroidal atrophy around each, and one or two spots of this at periphery of left fundus.
				„	'82, Mar. 11	Same condition.
17	J. L.	M.	46	2nd	'81, Dec. 11	Discs normal. A pearly patch of opaque fibres on inner side of right.
18	W. A.	M.	37	1st	'81, Dec. 25	Both discs perfectly normal.
				„	'82, Mar. 11	Both discs decidedly white, greyish white; inner edge of left alone somewhat pink.
				2nd	„ May 31	Right disc very pale, but slight tinge of pink on upper and inner side; left, lower and temporal portions very white, remainder pink.
				„	„ Aug. 23	Same condition.
19	P. M.	M.	42	2nd	'81, Dec. 26	Both discs perfectly normal (full red).
				„	'82, Mar. 8	Same condition.
				„	„ Dec. 28	„ „
				„	'83, Sept. 12	„ „
				3rd	'84, Feb. 20	„ „
20	W. Y.	M.	42	2nd	'81, Dec. 26	Both discs perfectly normal.
				„	'82, Mar. 8	Same condition.
				„	'83, Jan. 8	„ „
21	J. P.	M.	36	„	'81, Dec. 26	Both discs decidedly red—abnormally so; outer edge of left a little indistinct.
				„	'82, Mar. 11	Discs normal.

TY-SIX CASES OF GENERAL PARALYSIS OF THE INSANE (*continued*).

Refraction of Eyes.	Acuteness of Vision.	Condition of Pupils.	Termination of Case.	Remarks.
	R. $\frac{23}{30}$ J. 1 L. $\frac{23}{30}$ J. 1	Both 2½ mm., right acts very slightly to light, left acts freely; both act well to accommodation.		
Emm.	R. $\frac{23}{30}$ J. 16 L. $\frac{23}{30}$ J. 12	Both 3½ mm., right very slightly elongated vertically, very sluggish to light, but act slightly; act slightly to accommodation.	Died, '82, Mar. 8.	
Emm.	R. $\frac{20}{25}$ J. 1 L. $\frac{21}{25}$ J. 1	Both 3 mm., slightly elongated upwards and inwards; very sluggish action to light; act well to accommodation.	Died, '82, June 11.	
Emm.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	R. 3¼ mm., L. 3; R. acts well to light; L. sluggish; both act well to accommodation.	Died, '82, Nov 1.	
Emm.	R. $\frac{20}{25}$ J. 1 L. $\frac{20}{25}$ J. 1	Both 2½ mm., regular; act to light and to accommodation.	Removed from asylum, '82, Nov. 2.	
Emm.	R. $\frac{20}{40}$ J. 1 L. $\frac{20}{30}$ J. 1 R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1 R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	Both 3 mm., R. acts well to light, L. sluggish; both act to accommodation.	Removed from asylum, '82, Aug. 23.	The variations in the acuteness of vision, as tested by types at different periods, was doubtless due to the mental inattention that existed during the early stage of excitement.
Emm.	R. $\frac{20}{25}$ J. 6 L. $\frac{20}{25}$ J. 6	Both 4 mm., regular; act well to light and to accommodation.	Still under observation.	
Emm.	R. $\frac{20}{25}$ J. 1 L. $\frac{20}{25}$ J. 1	Both 2 mm., regular; no action to light, but act well to accommodation.	Died, '83, Dec. 3.	
ightly yopic.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	Both 2 mm., regular; no action to light, act well to accommodation.	Died, '82, Sept. 11.	

TABLE I.—Showing the Condition of the Eyes

No.	Initials of Patient	Sex.	Age.	Stage of Disease.	Dates of Examinations.	Condition of Fundus, &c.
22	J. R.	M.	50	2nd	'81, Dec. 26	Discs normal (full red).
"				"	'82, Mar. 11	Same condition.
"				"	'83, Jan. 5	Right discs normal (pink); left, inner edge little blurred.
23	E. J.	F.	35	3rd	'82, Jan. 2	Both discs somewhat white, but probabl normal. (A slight opacity in left lens.)
24	W. R.	M.	43	3rd	'82, Jan. 6	Discs normal.
25	P. T.	M.	49	2nd	'82, Jan. 6	Discs normal (pink).
				"	" April 26	" "
				"	'83, Jan. 5	" "
26	E. C.	F.	37	1st	'82, April 12	Discs normal.
				"	'83, Oct. 28	" "
27	J. M.	M.	42	2nd	'82, April 26	Discs normal.
28	S. B.	F.	40	1st	'81, Feb. 12	Discs normal.
				2nd	'82, April 7	Both discs distinctly atrophic; greyish-whit punched out appearance of edges; vessel both arteries and veins very small, pa ticularly the former.
				"	" Aug. 2	Discs greyish-white; appear flat; no distin cupping; vessels as before.
				3rd	'83, Jan. 25	Both discs of a staring greyish-white; edg sharply defined; vessels as before.
29	E. M.	M.	39	2nd	'82, April 29	Discs normal (pink).
30	T. W. C.	M.	35	2nd	'82, May 31	Discs normal (right, pink; left, red).
				"	" Dec. 28	" " " "
31	J. H.	M.	38	2nd	'82, May 31	Both discs normal (pink).
32	J. H.	M	43	2nd	'82, June 11	Both discs normal (pink). Edges of left son what jagged, but not obscured.
				"	'84, Feb. 20	Same condition.
33	M. K.	F.	45	2nd	'82, June 14	Both discs pale; nasal sides pale pink, te poral sides whitish, and present a stippl appearance; choroidal disturbance on ou side of each (progressive). Some want definition at outer margin of right disc.
				"	'82 Nov. 4	Discs appear normal (pink); edges defin (Cups shelve off gradually on tempo sides; lamina cribrosa well seen in each.
34	T. W.	M.	47	2nd	'82, June 14	Both discs very red throughout—hyperæm the redness is not simply due to diffu capillary tint, but there appears an act development of minute vessels; margin

XTY-SIX CASES OF GENERAL PARALYSIS OF THE INSANE (*continued*).

Refraction of Eyes.	Acuteness of Vision.	Condition of Pupils.	Termination of Case.	Remarks.
Emm.	R. $\frac{20}{40}$ J. 8 L. $\frac{20}{30}$ J. 8	R. 2½ mm.; L. 3 mm.; right, no action to light; left, very sluggish; both act to accommodation.	Died, '83, Oct. 15.	
..	..	R. 2 mm., L. 3½ mm.; scarcely any action to light, but act to accommodation.	Died, '82, Jan. 26.	Microscopical examination of optic nerves. Plate I. Fig. 1.
..	..	Both 3 mm.; act to light and to accommodation, but sluggish.	Died, '82 Mar. 11.	Indirect examination only. Large ulcers on corneæ. Microscopical examination of optic nerves.
Emm.	R. $\frac{20}{20}$ J. 1 L. $\frac{20}{20}$ J. 1	Both 2½ mm., regular; act fairly well to light, and well to accommodation.	Died, '83, July 8.	
Emm.	R. $\frac{20}{20}$ J. 1 L. $\frac{20}{20}$ J. 1	Both 3 mm.; scarcely any action to light.	Still under observation.	
R. Emm. L., simple myopic tigmatism.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{100}$ J. 1	Both 3 mm.; right acts well to light; left, no action; both act to accommodation.	Died, '82, April 26.	Accidentally suffocated by food getting into larynx. Microscopical examination of optic nerves.
..	..	.. ..	Died, '83, Mar. 14.	Microscopical examination of optic nerves. Plate II. Figs. 4 and 5.
	Could not count fingers accurately.	Both 3 mm., regular; very sluggish to light, but act to accommodation.		
Emm.	..	R. 2½ mm., L. 3, regular; scarcely any action to light, but act to accommodation.	Died, '82, Aug. 2.	
..	..	R. 3 mm., L. 2½; right slightly irregular; both act fairly well to light; very active to accommodation.	Died, '83, Sept. 9.	
..	..	R. 4 mm., L. 2½, regular; no action to light; act to accommodation.	Died, '83, June 23.	
. + 2 D. . + 2 D.	..	Both 3½ mm., regular; act well to light and to accommodation.	Still under observation.	
+ 3 D + 3 D	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	Both 1⅔ mm.; no action to light; act well to accommodation.	Died, '82, Nov. 11.	Microscopical examination of optic nerves.
+ 1 D + 1 D	R. $\frac{20}{20}$ J. 4 L. $\frac{20}{20}$ J. 4	Rt. 3 mm.; left 3½; regular; act well to light and to accommodation.	Removed from Asylum, '83, Aug. 27.	

TABLE I.—Showing the Condition of the Eyes

No.	Initials of Patient.	Sex.	Age.	Stage of Disease.	Dates of Examinations.	Condition of Fundus, &c.
34	T. W. *contd.*					little misty, especially at upper part; fine white line crosses inner side of le disc; ? exudation. Pigmentary disturbanc on outer side of each.
				2nd	'83, Jan. 8	Both discs red, but probably less so than whe last examined; upper and inner edge right disc is slightly ill-defined, but els where edges are quite clear.
35	J. G.	M.	36	1st	'82, Aug. 24	Both discs normal (pink); edges well-define
				2nd	'83, Jan. 8	Both discs perfectly normal.
36	H. K.	F.	40	2nd	'83, April 25	Right disc palish; margins somewhat i distinct; vessels normal. Left disc fla whitish; margins pretty distinct; vesse very small. Advanced condition of retinit pigmentosa in left eye. Floaters in le vitreous. Cortical striæ in each lens, mo marked in left.
37	G. O.	M.	59	1st	'82, Nov. 14	Right disc very red, but perhaps not abno mally so; edges defined. Left, large gla comatous cap, surrounded by a narrow ri which is probably formed by the sclerotic
				„	'83, Jan. 11	Same condition.
				„	'83, April 26	Same condition
				2nd	'84, Feb. 20	Same condition, but pulsation of arteri noted in right eye. Some increase of te sion in both globes.
38	J. B.	M.	36	2nd	'82, Nov. 14	Right disc pale pink; vessels rather smal white tissue around vessels; edges of di defined. Left disc very pale; vessels d cidedly small; much white tissue arou vessels. Edges defined.
39	W. R.	M.	28	1st	'82, Dec. 26	Right disc red throughout; outer marg quite clear and distinct; inner marg slightly softened, though edge can traced; white tissue very conspicuo around some of the vessels, even the ve small ones; a patch of white tissue arou a central artery just at its bifurcation very conspicuous. Left disc much the sa condition, but tint is more pink than re some slight blurring of inner margin; whi lines along vessels distinct, but not so w marked as in right. Vessels well filled in eac
				2nd	'83, Sept. 12	Same condition.
				3rd	'84, Feb. 20	Right disc pink; inner margin a little ind tinct (scarcely any physiological cup). Le pink; inner margin a little indistin Vessels normal in each.
40	H. T.	M.	40	2nd	'82, Dec. 26.	Both discs rather red, left the more so; edg well defined; vessels normal.
41	G. Mc.G.	M.	49	2nd	'82, Dec. 28	Both discs full red, but redness does not inva physiological cups, and edges are define
42	C. A. W.	M.	37	1st	'83, Jan. 10.	Both discs decidedly red throughout; edg defined; white tissue around vessels.
				„	'83, April 26	Both discs very red throughout; redn striated; margins run into retina; a lit white tissue around vessels.
				2nd	'83, Sept. 12	Much the same; redness very well mark and margins of discs very indistinct direct examination.

XTY-SIX CASES OF GENERAL PARALYSIS OF THE INSANE (*continued*).

Refraction of Eyes.	Acuteness of Vision.	Condition of Pupils.	Termination of Case.	Remarks.
Emm.	R. $\frac{20}{25}$ J. 1 L. $\frac{20}{25}$ J. 1	R. 3 mm., L. $2\frac{3}{4}$, regular; act well to light and to accommodation.	Died, '83, July 30.	
R. Emm. L – 5 D	..	R. $4\frac{1}{2}$ mm., L. 3, regular; scarcely any action to light, but act to accommodation.	Still under observation.	
..	R. $\frac{20}{30}$ J. 12 L. blind	..	Still under observation.	
Emm.	R. $\frac{20}{25}$ J. 1 L. $\frac{20}{25}$ J. 1	..	Died, '83, Feb. 24.	
Emm.	R. $\frac{20}{25}$ J. 1 L. $\frac{20}{25}$ J. 1	R. 4 mm., L. $4\frac{1}{4}$, regular; act very slightly to light, but well to accommodation.	Still under observation.	
Emm.	R. $\frac{20}{25}$ J. 1 L. $\frac{20}{25}$ J. 1	..	Died, '83, April 12.	Microscopical examination of optic nerves.
Emm.	..	..	Died, '83, May 23.	
..	..	Both 3 mm.; act to light and to accommodation.	Died, '83, Nov. 16.	Died of pneumonia. Microscopical examination of optic nerves, etc. Plate II. Fig. 6.

TABLE I.—Showing the Condition of the Eyes i

No.	Initials of Patient.	Sex.	Age.	Stage of Disease.	Dates of Examinations.	Condition of Fundus, &c.
43	A. K.	M.	54	2nd	'83, Jan. 11	Both discs pale, right decidedly so; vessels both arteries and veins distinctly small.
44	P. W.	M.	38	2nd	'83, Jan. 13	Right disc of a well-marked grey colour throughout, distinctly atrophic; vessels distinctly diminished in size, especially the arteries; a little choroidal disturbance at upper and outer part. Left, of a pale grey tint throughout; vessels slightly diminished in size, especially the arteries.
				„	'83, April 26	Both discs very white—have a punched out appearance, and appear somewhat excavated. Vessels diminished in size.
45	J. W.	M.	40	2nd	'83, Jan. 28	Right disc very pale; vessels distinctly diminished in size. Left disc (seen only by indirect examination) appeared normal (pink). Both lenses very hazy, and in right a distinct peripheral flocculent opacity on outer side.
46	R. B.	M.	56	2nd	'83, April 28	Both discs normal (pink); vessels normal.
47	W. W.	M.	35	1st	'83, April 28	Both discs normal (pale pink); vessels normal.
				2nd	'84, Feb. 20	Same condition.
48	S. Y.	M.	29	2nd	'83, April 28	Both discs very pale, with a very slight tinge of pink; R. the paler of the two; edges very clear and defined. Vessels perfectly normal.
49	S. B.	M.	35	2nd	'83, April 28	Both discs normal (pink); vessels normal.
50	W. C.	M.	57?	2nd	'83, June 23	Both discs perfectly normal (pink).
51	R. N.	M.	50	1st	'83, June 23	Both discs apparently normal, but edges a trifle hazy, especially in left; colour of discs, pink. (?) Arteries somewhat small. Floaters in each vitreous.
				„	'84, Feb. 20	Both discs red; margins a little misty-feathery. Arteries distinctly small.
52	J. B.	M.	40	1st	'83, June 23	Both discs normal (pale pink); vessels normal. A small spot of pigment on posterior surface of L. lens.
				„	'84, Feb. 20	Same condition.
53	A. B.	M.	32	1st	'83, June 23	Right disc decidedly grey—greenish grey; edges very clear; slight hollowing; vessels normal. L. same condition, but a little less marked.
				„	„ Nov. 23	Much the same condition, but, if anything, more marked; L. is, perhaps, now a little the paler of the two.
				2nd	'84, Feb. 20	Both discs greenish grey throughout. Arteries distinctly small.
54	P. McG.	M.	52	3rd	'83, June 23	Both discs normal (pale pink). Lenses; muddy striæ at lower and inner part of periphery of each.

X[illegible]-SIX CASES OF GENERAL PARALYSIS OF THE INSANE (*continued*).

Fraction Eyes.	Acuteness of Vision.	Condition of Pupils.	Termination of Case.	Remarks.
..	R. $\frac{20}{30}$ J. 16 L. $\frac{20}{30}$ J. 16	..	Died, '83, June 3.	
mm.	R. $\frac{20}{30}$ J. 19 L. $\frac{20}{30}$ J. 8	Both $1\frac{3}{4}$ mm., regular; no action to light, but act to accommodation.	Died, '83, May 5.	Died of pneumonia. Had clinical signs of locomotor ataxy, and after death grey degeneration of posterior columns of cord was found throughout greater portion of length. Optic nerves distinctly wasted to naked eye examination.
..	..	..	Died, '83, July 28.	Had clinical signs of lateral sclerosis.
mm.	..	R. 3 mm., L. $2\frac{1}{2}$, regular; no action to light, act fairly well to accommodation.	Died, '83, July 29.	
Ve[illegible] slight [illegible]opic sti[illegible]natism.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	R. 3 mm., L. 4; R. acts very slightly to light, L. not at all; both act fairly well to accommodation.	Still under observation.	
mm.	..	..	Died, '83, Oct. 8.	
mm.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	R. 3 mm., L. $2\frac{3}{4}$, regular; do not act to light, but act to accommodation.	Died, '84, Jan. 8.	
[illegible]am.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	Both $2\frac{3}{4}$ mm., regular; act to light, but sluggish; act well to accommodation.	Removed from Asylum, '83, July 23.	
mm.	R. $\frac{20}{30}$ J. 14 L. $\frac{20}{30}$ J. 14	Both $2\frac{3}{4}$ mm., regular; sluggish action to light; act well to accommodation.	Still under observation.	
mm.	R. $\frac{20}{30}$ J. 1 L. $\frac{20}{30}$ J. 1	Both $1\frac{3}{4}$ mm., regular; no action to light, but act to accommodation.	Still under observation.	
mm.	R. $\frac{20}{30}$ J. 6 L. $\frac{20}{30}$ J. 6	Both 3 mm., regular; no action to light, and very little to accommodation.	Still under observation.	Partial paralysis of 3rd nerve in right eye, indicated by external strabismus and slight ptosis.
..	..	..	Died, '83, Aug. 8.	

TABLE I.—Showing the Condition of the Eye

No.	Initials of Patient.	Sex.	Age.	Stage of Disease.	Dates of Examinations.	Condition of Fundus, &c.
55	J. T.	M.	42	2nd	'83, June 23	Both discs normal (pink). R., well-mark appearance of opaque fibres surrounding t disc, the margins of which, however, defined, the opacity not invading the s face of the disc itself. L., considera pigmentary disturbance at inner and ou margins.
				„	'84, Feb. 20	Same condition.
56	T. H.	M.	42	2nd	'83, June 23	Both discs normal (pink).
				„	'84, Feb. 20	Same condition.
57	H. C.	F.	44	2nd	'83, Aug. 22	Both discs normal (pale pink); arteries rath small; choroidal disturbance around righ floaters in both vitreous bodies; coni cornea in left eye.
58	J. N.	M.	43	2nd	'83, Sept. 4	Both discs pale pink; edges defined; we marked sclerotic rim, forming a sm crescent on outer side; vessels a little sm especially on left disc.
59	H. E.	M.	42	2nd	'83, Oct. 27	Both discs perfectly atrophic; surface fl edges blurred; veins very slightly dim ished in size, arteries considerably so.
				„	'84, Feb. 20	Same condition; veins much diminished left disc. Numerous small pigment sp in retina.
60	R. B.	M.	36	2nd	'83, Nov. 23.	Both discs full red; inner edges sligh softened. R., well-marked crescent at ou and lower parts, and small one on inn L., small crescent at outer and lower pa
61	M. A.	F.	45	2nd	'83, Dec. 8	Both discs normal (full pink).
				„	'84, Feb. 23	Same condition.
62	E. T	F.	25	1st	'84, Jan. 19	R. disc, margins very indistinct; vess diminished, the arteries being very fi retinitis pigmentosa, the pigment exte ing quite up to disc; one or two floaters vitreous. L. disc, and retina in same c dition, but less marked; disc red in cent the pigment extends only to the mid zone of retina.
63	M. C.	F.	38	1st	'84, Jan. 19	Both discs normal (red); vessels normal. slight granular appearance at R. macu and at L., pale buff patches finely sprink with black.
				„	„ Feb. 23	Same condition.
64	M. R.	M.	32	1st	'84, Jan. 20	Both discs pale pink; R. the paler of the t A small, irregular-shaped crescent arou each, especially at outer part. Middle z of each fundus covered with well-mark circular, pigmented, white patches of c roidal inflammation, ? syphilitic, m marked in L.; floaters in L. vitreous.
65	W. W.	M.	52	2nd	'84, Jan. 20	Both discs normal (red).
66	S. F.	F.	23	3rd	'84, Feb. 2	Both discs normal (pink).

TY-SIX CASES OF GENERAL PARALYSIS OF THE INSANE (*continued*).

fraction Eyes.	Acuteness of Vision.	Condition of Pupils.	Termination of Case.	Remarks.
–1 D –1 D	..	Both 3 mm., regular; act to light and to accommodation.	.. Still under observation.	
mm.	..	..	Still under observation.	
+2 D. +3 D.	..	..	Died, '84, Feb. 22.	
..	..	Both 3 mm., regular; act to light, but sluggish; act well to accommodation.	Died, '83. Nov. 28.	
mm.	Blind	Both 4 mm.; no action to light; act slightly to accommodation.	Still under observation.	Has signs of sclerosis of lateral columns of cord.
htly + h eye.	..	..	Died, '83, Dec. 7.	A case which ran a very rapid course.
mm.	..	R. 2½ mm., L. 2. R. acts very slightly to light; L. not at all. Both act to accommodation.	Still under observation.	
mm.	..	R. 3 mm., L. 3½. Both act to light, but sluggish; act to accommodation.	Still under observation.	R., well-marked nebula about centre of cornea; on anterior surface of lens, a cluster of small brownish spots. L., two faint nebulæ on cornea, one or two old adhesion bands, and an appearance as of new growth around margin of dilated pupil.
simple +stigma- ism. Emm.	R. $\frac{20}{30}$ J. 4 L. $\frac{20}{30}$ J. 1	Both 3 mm., regular; act to light and to accommodation.	Still under observation.	
– 3 D. – 3 D.	..	..	Still under observation.	
..	..	R. 4 mm., irregular; L. 3, act slightly to light.	Still under observation.	
– 5 D. Emm.	..	R. 5 mm., L. 4; both act to light.	Still under observation.	Has signs of lateral sclerosis.

TABLE II.—Showing the Condition of the Optic Discs, &c., in Twelve cases of Mania, in which Slight (or Doubtful) Abnormalities were Detected.

No.	Sex.	Age.	Form of Mania.	Condition of Fundus, &c.
1	F.	38	Acute (recent)	Both discs pink, edges perhaps a little hazy; a spot of pigment on outer edge of right.
2	F.	53	„ „	Both discs very red, about the same colour as the fundus; edges a little blurred.
3	F.	42	„ „	Both discs red and hazy. ? Vessels a little small. Well-marked syphilitic choroiditis in each eye, all over fundus; gross changes; large white patches mottled with black.
4	M.	42	„ „	Both discs decidedly red, right the redder of the two, and the margin of this, especially at upper part, is not very clearly defined (probably on account of similarity of colour between it and fundus).
5	F.	23	Puerperal	Both discs perfectly normal; arteries rather small; *veins abnormally full* (a second examination made after an interval of 11 months, when patient was convalescent, showed the veins to be full, but not abnormally so; condition otherwise unchanged).
6	F.	29	„	*1st examination.*—Both discs full red; edges well-defined; striation of small vessels distinct. *2nd examination* (12 days after 1st).—Much the same condition; substance of disc has a slightly softened appearance.
7	F.	30	„	*Examination 24 hours before death.*—Both discs red, but redness does not invade central cups; colour of left disc almost that of surrounding fundus, but edge can be traced, though it is somewhat indistinct.
8	F.	22	„	Both discs red throughout; upper and inner portion of left disc slightly misty. (Note.—*Patient had mitral stenosis.*)
9	F.	30	„	Both discs decidedly red, but edges are perfectly defined. (*Indirect examination only; patient very excited.*)
10	F.	41	Chronic	R. disc greyish-white; vessels decidedly small; enormous staphyloma around disc developed chiefly to outer side, extending by a series of spots of partial atrophy, as far as macula; small central opacity in posterior capsule of lens; numerous floating bodies, large and small in vitreous, which fall rapidly; −12 D. L. disc has a faint tinge of pink; vessels larger than in right; a small spot of atrophy in vicinity of macula; small floaters in vitreous; −7 D.
11	F.	65	„	Both discs normal (pink); vessels small, especially arteries (both lenses hazy, and marked cortical striæ in each).
12	F.	34	Delusional (monomania.)	Discs somewhat red, and edges a little indistinct.

TABLE III.—Showing the Condition of the Optic Discs, &c., in Nine cases of Melancholia, in which Slight (or Doubtful) Abnormalities were Detected.

No.	Sex.	Age.	Form of Melancholia.	Condition of Fundus, &c.
1	F.	46	Active (recent)	Discs normal (pale pink), *Arteries* full—as large as veins or nearly so. Pigmentary deposit on outer side of each disc.
2	F.	27	„ „	Discs decidedly red, but probably normal.
3	F.	55	Passive (recent)	Right disc palish, flat; margins a little indistinct; arteries small; left disc whitish; margins a little blurred; appears flat. Vessels, both arteries, and veins, decidedly small. [History of chronic alcoholism.]
4	F.	30	„ „	Both discs normal (pale-pink); vessels, both arteries and veins, rather small.
5	M.	46	„ „	Both discs pale, with a shade of pink. (Three examinations made at intervals of 3 or 4 months; same condition each time, except that on first examination, the arteries were thought to be a little small; they were however normal on subsequent examinations) On anterior surface of capsule of right lens, very small brown pigment spots. [This case has some of the symptoms of General Paralysis, and that disease cannot at present be confidently excluded.]
6	F.	42	„ „	Both discs pale pink; edges slightly misty; vessels a little small; several recent hæmorrhages, small, and of moderate size, in both retinæ, not far from disc in right, especially about macula; one or two indistinct white patches in right retina, but there are several of these well marked in left. [Patient has chronic Bright's disease.]
7	F.	32	„ „	Both discs very pale; distinctly anæmic. [Patient masturbates excessively.]
8	F.	53	Passive (chronic)	Inner side of each disc, especially left, has a peculiar variegated or speckled appearance, due to the presence of five white lines or streaks; they otherwise appear normal; white lines very marked along some of the vessels. A pigmentary deposit at upper part of left fundus. (Two examinations made at an interval of 11 months —condition each time practically the same.)
9	F.	35	„ „	Both discs normal; a small horizontally-placed recent hæmorrhage on inner side of left disc.

TABLE IV.—Showing the Condition of the Optic Discs in Two cases of Mental Stupor during the Attack and after Convalescence.

No.	Sex.	Age.	——
1	F.	29	*1st examination—during condition of stupor.* Both discs perfectly normal (pink). *2nd examination—during lucid interval.* R. disc red, L. more pink than red; edges quite clear and defined; vessels normal. (Hypermetropic astigmatism in each eye.)
2	F.	40	*1st examination—during condition of stupor.* Both discs pale; edges well defined. *2nd examination—state of mental hebetude during convalescence.* Both discs pink, inclining to pale. *3rd examination—after convalescence.* Both discs still palish, as in last note.

TABLE V.—Showing the Condition of the Optic Discs, &c., in Fifteen cases of Dementia in which Abnormalities were Detected, the Majority being Slight or Doubtful.

No.	Sex.	Age.	Form of Dementia.	Condition of Fundus, &c.
1	F.	64	Secondary to Mania.	Both discs colour of fundus, but edges distinct, except so far as indistinctness results from similarity of colour between disc and choroid; vessels a little small. (Patient has granular kidneys.)
2	F.	39	„	Discs normal (pale); arteries rather small.
3	F.	27	„	R. disc very red throughout; edges a little ill-defined; a band of white tissue stretching across central part of disc in a horizontal direction. L. disc, red; very slight want of definition about edges; no white tissue; vessels in each well filled.
4	F.	22	„	Both discs rosy red; edges of left perhaps slightly hazy to direct examination; veins large and dark; patch of pigment on inner side of right disc, and a cluster of pigment patches surrounded by an irregular greyish-white patch in vicinity of R. macula, over one of which patches a small artery can be traced by direct examination.(−7 D. each eye.)
5	F.	32	„	Both discs very red; margins slightly misty (two examinations at intervals of 7 months; same condition each time).

TABLE V.—Showing the Condition of the Optic Discs, &c., in Fifteen cases of Dementia in which Abnormalities were Detected, the Majority being Slight or Doubtful (*continued*).

No.	Sex.	Age.	Form of Dementia.	Condition of Fundus, &c.
6	F.	31	„	Both discs very red, and edges appear somewhat ill-defined, especially inner edge of left; vessels normal.
7	F.	53	„	Both discs pearly white; in both, arteries exceedingly fine, threadlike, and few in number; veins also rather small. R., white spots at macula of fair size, also a few to outer side of macula; below and to outer side of disc is a punched-out spot of choroidal atrophy, with fine retinal vessel passing over it; smaller and fainter spots in the vicinity of this. L., minute white spots around macula. (Patient has chronic Bright's disease.)
8	M.	50	„	Both discs red throughout; the slightest possible softening of edges. (Two examinations at interval of 2 months; same condition each time.)
9	F.	28	Primary (recent and chronic).	Both discs normal; tint inclining to pale; arteries rather small.
10	F.	30	„ „	Both discs very red; on inner side the surface of each disc has a slight velvety appearance (most marked in left); edges perfectly clear and defined.
1	F.	28	„ „	Both discs very red; white lines very distinct along some of the vessels.
1 2	F.	49	Organic.	R. disc greyish, and slightly swollen at the lower part; vessels rather small; three large recent hæmorrhages on inner side of disc; a large, irregular-shaped patch of choroidal atrophy, about size of disc, on outer side of this. L. disc, swollen; inner edge cannot be seen, outer very faint—quite woolly; veins large, white lines around; a large recent hæmorrhage on inner side of disc. [Patient had chronic Bright's disease.]
13	M.	47	„	R. disc very red; some pigmentary disturbance around chiefly on outer side; Left disc, similar conditions but less marked. [Patient had R. hemiplegia and aphasia.]
14	F.	67	Senile	Both discs very red; slight crescent at outer side of each most marked in R.; lenses; hazy, with cortical striæ. (R. eye,—5 D.)
5	M.	61	„	Both discs pale pink; vessels a little small, especially the arteries; discs have a hollowed appearance; lenses; slight cortical opacities.

TABLE VI.—Showing the Condition of the Optic Discs, &c., in Seven cases of Insanity associated with Epilepsy, in which Slight (or Doubtful) Abnormalities were Detected.

No.	Sex.	Age.	Form of Mental Disorder.	Condition of Fundus, &c.
1	F.	28	Imbecility	Right disc distinctly hyperæmic in centre. (Left disc could not be examined owing to patient's restlessness.)
2	F.	17	„	Both discs normal (rosy-red); edges well defined; arteries a little small; veins full.
3	F.	20	„	Both discs very red, the redness invading slightly the physiological cups. Right eye a few scattered yellowish-white spots a little above macula; left, the same, but running into macula, and in addition two or three spots between macula and disc.
4	F.	37	„	Both discs very red—abnormally so; margins very slightly blurred; very well marked white lines along vessels—best seen in right disc.
5	F.	12	„	Both discs full red. On inner side of right disc, a distinct white streak.
6	M.	48	Slight Dementia.	Both discs normal (pink): arteries small.
7	F.	32	Profound Dementia.	Both discs pale, the right being the paler of the two; probably normal. (Two examinations at an interval of 3 weeks—same condition each time, except that on second examination, a minute hæmorrhage was noted on an artery on right side.)

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