

it is more especially in cases of what Jackson calls "coarse" disease, disease with gross macroscopical change in the brain or its membranes, that the ophthalmoscope is most useful, such as tumor of the brain, abscess of the brain, effusion from meningitis and gumma of the brain. In such cases optic neuritis makes its appearance; of the form known as "descending neuritis." In these cases there are often no external signs. The vision may be good and remain so for some time. A case recorded by Manthner retained good vision until death. Even the pupil is unaffected at first; the ophthalmoscope alone reveals the true state of affairs. We find the optic nerve swollen, cedematous, its borders hazy or lost, the veins enlarged and tortuous, the arteries normal, or small and buried in effusion. It has been proved both practically and experimentally that increase of the intra-cranial pressure will so influence the fluid in the sub-dural and sub-arachnoid spaces as to force it into the vaginal lymph spaces of the optic nerve and cause swelling and inflammation of the connective tissue of the optic nerve, obliteration of the space, and atrophy of the nerve fibres. This is what is known as "Stauung's papilla," or "choked disc." The tables of Edwards and Lawford<sup>1</sup> show that choked disc occurs in 66% of tumor of the brain, and Beonhard statistics show that in 45% of cases of choked disc vision remains intact.

As regards the frequency with which changes are recognizable with the ophthalmoscope. Heinzl<sup>2</sup> has published a series of sixty-three cases of cerebro-spinal meningitis, intra-cranial tumors, tuberculous meningitis and sclerosis of the brain. Among these cases 47 had alterations in the optic disc, and 16 had not. Allbut observed among 38 cases of tubercular meningitis, 29 who had ophthalmoscopic lesions. Annoke<sup>3</sup> and Reich collected 88 cases of intra-cranial growth with ophthalmoscopic examinations and autopsies and found ophthalmic changes in 75 per cent. In cases in which the ophthalmoscopic examination gives negative results limitations of the field of vision may be mapped out by the perimeter and give valuable diagnostic indications

When we remember the direct connection which exists between the eye and the brain through

Schwabe's space, it is rather a matter of wonderment that we do not find cent. per cent of eye lesions to brain lesions, especially in such cases as epidemic cerebro-spinal meningitis. It does not unfrequently happen that we meet not only with neuro-retinitis, but with purulent choroiditis in these cases.

In epilepsy the optic nerve is not usually affected. In the so-called thalamic epilepsy, the "flimmer scotom" of German writers, Forster's amaurosis partialis fugax, the ophthalmoscopic appearances are negative. It happened to me once to be present when a patient of mine was so attacked. I found the optic disc pale and the vessels contracted; there was an irregular pulsation of the veins.

In insanity, atrophy of the optic nerve or neurites opticæ are frequently observed. Allbutt, publishes the following interesting statistics of 43 cases of epilepsy with dementia, 15 had alterations in the optic nerve. Of 51 cases of mania 25 showed ophthalmoscopic changes. In 38 cases of dementia without epilepsy, 23 times were disease of the optic nerve and retina observed. In cases of melancholia the retina is very often anæmic. In paralysis of the insane, of 53 cases only five were found in which there were no optico-retinal changes. To recapitulate, diseased fundi to normal, bore the following proportions: — Dementia, 12.6, acute and subacute mania, 14.6, chronic mania, 3.3 melancholia, 1.4, general paralysis, 11.0.

Having thus shown the intricate relationship between disease of the brain and disease of the optic nerve, I invite your attention to the consideration of the connection between diseases of the spinal cord and of the optic nerve.

The title of this paper precludes the consideration of the alterations of the pupil and paralysis of the ocular muscles in spinal disease, but I would draw your attention to the great frequency of atrophy of the optic nerve in tabes dorsalis. Leber<sup>4</sup> of 87 cases of atrophy observed by him, 23 were associated with tabes, this is about 26 per cent. of the cases. Charcot states that the optic nerve trouble often precedes the spinal disease by many years, and that the pain and muscular incoördinance follow. It usually begins with a contraction of the field of vision; of the subjective

1. Trans. of the Soc. of United Kingdom.

2. Jahrbuck für Kinderheit Kunde 1875.

3. Coleman, The Ophthalmoscope in Brain Disease.

4. On the use of the ophthalmoscope, page 364.

5. Arch. für Ophthal. XV. 3, p. 33.