PART III.

HALF-YEARLY REPORTS.

REPORT ON OPHTHALMIC SURGERY.

By ARTHUR H. BENSON, M.A., Univ. Dub.; F.R.C.S.I.; Ophthalmic and Aural Surgeon to City of Dublin Hospital; Assistant Surgeon to St. Mark's Ophthalmic Hospital.

DURING the past year no very remarkable advances have been made in ophthalmic surgery, though in many directions much valuable work has been done. Many of the disputed points in ocular histology, pathology, anatomy, and therapeutics, have been carefully investigated and elucidated to a considerable degree. The year, therefore, though it cannot be regarded as one of very rapid progress, must be held to have been one of steady advance all along the line.

ANATOMY.

The Iris and Suspensory Apparatus of the Lens have been especially investigated.

Berger (*Contributions to the Anatomy of the Eye in its Normal and Pathological State*, Wiesbaden, 1887) has worked at the normal anatomy of the posterior chamber and the suspensory apparatus of the lens, and summarises his results as follows:—

1. The posterior chamber is divided into a space free from fibres of the zonula (præzonular), a second containing them (zonular), and a third lying behind the zonula (postzonular).
2. The præzonular is from 0.2 to 0.4 mm. deeper in the ciliary depressions than in the ciliary elevations.
3. From the zonular portion blind offsets extend into the depressions between the ciliary processes, and reach 1.0 to 1.5 mm. further back.
4. Most of the fibres of the zonula end in the anterior or posterior capsule of the lens; some, however, in the equatorial portion of the latter. The most anterior and the most posterior fibres of this lenticular band are most numerous, so that the latter can be filled with a viscid mass (albumen) (Hanno-

ver's canal). Injected air, or a solution of aniline, passes through the lenticular band into the anterior chamber. 5. The postzonular portion of the posterior chamber is of a capillary nature. Its anterior boundary lies 1 mm. inward from the equator of the lens, its posterior one 2 mm. from the ora serrata. Its anterior wall is formed by the fibres of the zonula or the posterior ones of the lenticular band respectively; its posterior wall partly by thickened vitreous tissue, partly by fibres of connective tissue (lig. hyaloideæ capsulæ). Very delicate, reticulated fibres pass through the postzonular portion; it rarely contains rigid fibres of the zonula. 6. A postzonular (Petit's) canal is formed by detachment of the vitreous produced by an exudation (cyclitis, staphyloma bulbi, glaucoma), or it results from changes after death, or it can be produced by injection. Numerous "rigid" zonular fibres are visible in Petit's canal only in eyes in which putrefaction has begun, or they are the result of an imperfect injection. 7. The posterior portion can be injected with a viscid mass like albumen, or with air, but not with a solution of aniline. When albumen is used, however, it also enters the lenticular bands. The belief is wrong that by injection of the zonular portion of the chamber a "canal godronné" can be produced, the anterior wall of which is formed by the lamina vitrea of the pars ciliaris retinæ. 8. The outer layer of the vitreous is united in form of a circle with the posterior capsule of the lens, forming a postlenticular capillary space.

PUPILS.

Iwanow has investigated the question of the inequality of the pupils in healthy persons. His measurements were of 134 healthy young military recruits, and he found an equal width of the pupils in only 12 of them. The right pupil was larger in 49, the left in 73. The face was asymmetrical in 131, the left being larger in 99, the right in 32. The larger pupil frequently belonged to the smaller side of the face, while the latter usually seems to belong to the larger side of the body. An unequal width of the pupil does not, therefore, always have a pathological significance.

The "Pupil-symptoms met with after Injuries to the Head, &c.," have been treated of by J. Hutchinson, Junior (*Ophth. Rev.*, Vol. VI.). The chief points noted in this paper are—1. In most cases of concussion, for a variable time, depending on the severity of the injury, the state of the pupils resembles that met with in ordinary anæsthesia produced by ether, chloroform, &c.—i.e., slowness to

respond to light without marked myosis or mydriasis. 2. In a small proportion of cases of concussion temporary mydriasis (unilateral or bilateral) is met with. 3. When inflammatory reaction follows severe bruising of the brain myosis is the rule. 4. In compression of the brain, from meningeal hæmorrhage, mydriasis on the side of the lesion is met with in at least half the cases, double mydriasis occurring next in order of frequency, myosis being very rare. The pupil symptom here is probably dependent on pressure on the corpora quadrigemina rather than on the trunk of the third nerve. 5. In cases of injury to the cervical sympathetic active myosis does not occur, but the pupil on the side affected will not dilate in dull illumination. 6. From the preceding cases the course of the "cervical splanchnic" in man appears to be the same as that proved experimentally in lower animals.

The Reaction of the Pupil to Light: its Observation, Measurement, and Clinical Signification.—This subject has been exhaustively studied by Heddaüs, of Halle. He considers that it is probable (*Ophth. Rev.*, p. 169) that there are special centripetal pupillary fibres, that these run in the optic nerve with the macular fibres, and that the pupillary fibres are more resistant to pathological processes than the visual. Also he agrees with Beechterew that these fibres probably do not pass into the optic tracts, and do not decussate in the chiasma, but pass back behind the chiasma directly into the grey matter surrounding the third ventricle, and so reach the oculo-motor nucleus of their own side. From this it would follow that dilatation of the third ventricle would cause dilatation of both pupils, and that unilateral destruction of the grey matter in the wall of the third ventricle would cause reflex insensibility on the same side. Of this he gives some evidence. He does not discuss pupillary change from disease of the pupillary reflex centre.

The local action of drugs on the intra-ocular muscles of mammals has been studied by Jessop (*Ophth. Rev.*, Vol. VI.), with the following interesting results:—

Eserin acts on the intra-ocular muscles as on the unstriated muscle of other parts by stimulating directly the muscular fibre.

The action of atropin is by paralysing directly the unstriated muscular fibre; that of eserin by stimulating such fibre; and that of cocain by stimulating the endings of nerves relaxing the muscles.

The experiments on the antagonism and combined actions of

these three drugs on the pupillary muscle show the following results:—

Atropin and Eserin.—In ordinary atropin mydriasis, the addition of eserin reduces the dilatation of the pupil, but if the *ad-maximum* atropin mydriasis be induced eserin has no effect. The reason of this is that as long as the muscular fibre is not completely paralysed eserin can stimulate it, and produce myosis, but when complete palsy ensues eserin has no effect. If eserin and atropin be used together myosis ensues first, and is afterwards followed by dilatation of the pupil. Atropin always overcomes eserin myosis if used long enough.

Atropin and Cocaïn.—Cocaïn mydriasis is not increased by atropin, but the pupil no longer acts to light and accommodation. Atropin mydriasis is usually increased by cocaïn, but, in rare exceptions, where the *ad-maximum* atropin dilatation has been produced, the addition of cocaïn has no effect.

Cocaïn and Eserin.—Full eserin myosis is never overcome by cocaïn. Eserin always reduces cocaïn mydriasis. The mixture of cocaïn and eserin (2 per cent. solution of each) in the proportion of 26 of cocaïn to one of eserin produces no change in the pupil.

Of the mydriatics belonging to the same group as atropin—viz., homatropin, daturin, duboisin, hyoscyamin, hyoscin, gelsemin, and scopolein—the physiological action is the same, and they differ simply in the intensity of their effects. The most important of them are homatropin and hyoscin.

Homatropin is the most frequently used, and its action is quicker, weaker, and less lasting than atropin.

Hyoscin is the strongest and quickest in its action, but though clinically very useful, it is dangerous in cases predisposing to glaucoma, as eserin has no effect on the mydriasis induced.

The other myotics—pilocarpin, nicotin, and muscarin—act on the unstriated muscular fibre of the intra-ocular muscles as eserin by stimulating it, and thus inducing contraction.

Pilocarpin is a much weaker drug than eserin, and the ratio of their respective strengths on the pupil may be estimated by their behaviour with cocaïn, when eserin is found to be seven times stronger than pilocarpin. Pilocarpin has no effect on the atropinised pupil.

Muscarin acts more energetically on the ciliary muscle than on the pupillary.

“The Influence of Mydriatics and Myotics on the Intra-Ocular

Pressure under Physiological Conditions" has received attention from Dr. F. Stocker, of Lucerne (*Archiv. f. Ophth.*, XXXIII.). He found the *Normal Intra-ocular Pressure* (Curare) varied from 25 to 32 mm. hg., being higher in vigorous than in feeble animals.

Atropin, applied to the conjunctiva in 1 per cent. solution, produced in all cases a gradual *fall* of the intra-ocular pressure; the fall was in one case as much as 10 mm hg., in another 6 mm. The lowest pressure coincided with the maximal dilatation of the pupil.

Cocain, in 4 per cent. solution, *reduced* the intra-ocular pressure by 2 mm. or 3 mm. hg. In some cases a slight rise of pressure preceded the fall.

Eserin, in 1 per cent. solution, caused *first a rise* of pressure; *then a fall* of pressure greater than the previous rise. The pressure reached its highest point before the commencement of myosis. In the typical case given in detail the initial pressure was 28 mm.; the primary rise was 3 mm., which at the end of twenty minutes passed away; at the end of another twenty minutes the pressure had fallen to 22 mm., while the fellow eye had fallen to 26 mm.

Pilocarpin, in 2 per cent. solution, produced first general symptoms due to systemic absorption—viz., salivation in five to ten minutes, and during about forty minutes considerable oscillations of the intra-ocular pressure in both eyes due to systemic excitement. When these had subsided, the pressure *fell* in the pilocarpin eye to 4 mm. below that in the fellow eye.

The Action of the Pupil stands, according to the foregoing results, in no fixed causal relationship to the changes of pressure within the eye, for the pressure was seen to fall both during increasing mydriasis and during myosis.

In addition to the foregoing, Stocker made some observations with the ophthalmometer concerning the corneal curve under the influence of these several drugs. Atropin and cocain produced no change in the curvature of the cornea beyond such as might be due to errors of observation. Eserin and pilocarpin produced a diminution in the radius of the cornea; thus in one case the initial radius was 7.416 mm.; twenty-five minutes after the use of eserine it was 7.27 mm.

GLAUCOMA.

Much labour is yearly expended upon the endeavour to replace with light the darkness which at present invests the subject of the

pathology of glaucoma, and Priestly Smith, of Birmingham, has added one more to his already long list of valuable communications on this matter. In his article "On the Shallow Anterior Chamber of Primary Glaucoma" (*Ophth. Rev.*, Vol. VI.), he suggests a somewhat novel view of the case. We quote his words:—

"The vessels of the uveal tract are overfilled; the ciliary processes swell up; a part of the aqueous is expelled and the lens advances; the angle of the chamber is compressed. From this moment the intra-ocular pressure rises rapidly, and the obstruction at the outlet intensifies itself. The increased pressure within the eye embarrasses the escape of venous blood still further and aggravates the swelling of the processes; the engorgement increases, the lens is driven forward still more forcibly until not an atom more of the aqueous can be forced through the closed outlet; a shallow but firmly locked anterior chamber remains. The internal circulation of the eye is strangulated because the normal process of compensation by the aqueous is arrested. The external vessels dilate, and serum escapes in the directions of least resistance. This is acute glaucoma.

"The foregoing description of acute glaucoma involves a conception which, so far, at least, as I am concerned, is new. *The high tension depends more upon an excess of blood in the eye, than upon an excess of the intra-ocular fluid.* We see evidence of this fact in the free escape of blood which commonly accompanies an iridectomy for acute glaucoma.

"A shallow anterior chamber is less characteristic of the chronic non-congestive type of glaucoma than of the acute congestive. This of itself indicates the close connection of the symptom with vascular disturbance. I imagine that *glaucoma fulminans* is the expression of a maximum obstruction of the circulation, *glaucoma simplex* of a minimum, the conditions of the eye which predispose to the disease being similar in the two cases."

Birnbacher and Czermak, of Graz (*V. Graefe's Archiv.*, XXXII.), have contributed to our knowledge of the "Anatomy and Pathology of Glaucoma." They have shown that the glaucomatous eyes examined by them exhibited conditions tending to raise the intra-ocular pressure in the narrowing of lumen in the emissaries of the vortex veins, the adhesive inflammation round the venous trunks, and the thickening of their walls. (The ligation of even one vein, as Schultén has shown, is enough to raise the

pressure inside the globe by restricting the venous outflow.) Besides this restriction of the venous outflow the fluid of the tissues of the globe was prevented from escaping by the adhesive inflammation and thickening of the wall of the vein, and also by the obliteration of the angle of the anterior chamber.

The general conclusion of this highly instructive paper is that primary chronic inflammatory glaucoma is due (in some cases, though possibly not in all) to anatomical changes produced by antecedent inflammation in the anterior portion of the uveal tract, which hinder the outflow of blood and more especially lymph from the eyeball, and accordingly elevate the intra-ocular pressure.

OCULAR CONDITIONS IN BRAIN DISEASES.

Deutschmann, of Göttingen, has published a monograph "On Optic Neuritis, especially the so-called Choked Disc, and its connection with Brain Diseases" (Jena, 1887). Its conclusions are largely the results of his own and Leber's investigations and experiments. We quote from the *Ophthalmic Review*, Vol. VI., p. 107, &c.:

"He states that in all the many cases examined before and after death by Leber and by himself, the changes could be regarded as due only to inflammation. In all there is exudation, with lymph corpuscles, in the tissue of the papilla and the surrounding retina, proliferation of connective tissue, and thickening of nerve fibres; sometimes an aggregation of lymph cells in the sheaths of the central vessels; and always an inflammatory change in the choroid adjacent to the disc, presenting dilatation of vessels, and more or less infiltration with lymph cells. In short, the microscopic appearances are indistinguishable from those of the papillitis, which accompanies leukæmia and nephritis. Further, it is noteworthy that the appearances of the so-called choked disc are met with, according to Brailey and Williams, in many cases of injury of the eye, where compression of the disc, as an essential cause, can play no part. Gowers states that in sections of the choked disc there is never any evidence of compression of the vessels at the point where they pass the scleral ring, but that such compression, when it occurs, is the result of the inflammatory swelling in the tissue of the papilla. Moreover, it is to be noted that the supposed agent in the choking of the disc, the fluid distending the nerve sheath, is by no means always present, even when looked for with every precaution in the way of ligaturing the nerve.

"From the anatomical standpoint, therefore, Deutschmann arrives at the following conclusions:—The so-called 'choked disc' (Stauungspapille) is from the beginning an inflammatory condition—a true neuroretinitis. There is no anatomical evidence in favour of the supposition that it is caused by compression of the ocular end of the nerve; the anatomical facts are opposed to this assumption."

Edmunds (London), in commenting on Deutschmann's views on Optic Neuritis (*Oph. Rev.*, Vol. VI.), remarks, in answer to Deutschmann's statement that as regards the frequency of occurrence of papillitis in intra-cranial tumour, "the precise seat . . . of the tumour appears to make no difference." In an analysis (*Ophth. Soc. Trans.*, Vol. IV., p. 172, 1884) of ninety-six cases of fatal cerebral tumour he found that optic neuritis was present in eighty-six per cent. of the cases in which the new growth was situated in the basal ganglia or in the cerebellum, whereas in only forty-six per cent. of those cases where the tumour was at the convexity of the brain did neuritis occur, a sufficiently noticeable difference as to frequency.

INFLUENCE OF MENSTRUATION ON VISION.

Finkelstein, of St. Petersburg, has investigated the subject of "Sensory Disorders in Diseases, and Changes of the Fields of Vision in Menstruation," which he has made the subject of an Inaugural Address.

Finkelstein studied the functional activity of the eye during menstruation in twenty healthy women, aged from nineteen to thirty-three. From this group of observations the following deductions may be drawn:—1. During the menstrual period there takes place a concentric narrowing of the field of vision. 2. The phenomenon makes its appearance one, two, or three days before the beginning of the hæmorrhage, reaches its greatest intensity on the third or fourth day of menstruation, and then gradually disappears about the seventh or eighth day of the period. 3. The narrowing varies in degree in individual cases. In general, it is more pronounced in those women whose menstruation is associated with malaise, headache, cardiac palpitation, and other nervous symptoms, as well as in those who lose large quantities of blood. 4. Not only the field of vision for white, but also the visual fields for green, red, yellow, and blue, undergo a regular diminution. 5. Perversion of perception of green (which is then seen yellow) is

observed fairly often (in twenty per cent.), the phenomenon disappearing simultaneously with the contraction of the fields. 6. The central vision becomes impaired but slightly, to rapidly return to the standard after catamenia. 7. Refraction remains intact.

THE POSITION OF THE HEAD IN WRITING.

Schubert, of Nürnberg (*V. Graefe's Archiv.*, XXXII.), has urged the importance of a proper position of the head in writing, and lays down the rule that all children should be taught a perpendicular handwriting. Even if the erect median position of copy book be not actually better than the oblique median, still the teacher cannot tell when inspecting writing done at home what absurd position may have been adopted in writing, if the child is permitted to write anything but perpendicular letters. These latter can only be executed in the erect median position. It may be possible for adults to write more rapidly a slanting than a perpendicular hand, but children are not required to write rapidly, but in a manner that does not tend to deform their vertebral columns or their eyes. In many countries now-a-days, and in times past, perpendicular handwriting alone obtains, and Schubert appends a series of facsimiles of German handwriting in every century from the 8th to the 18th inclusive. From this it is seen that slanting letters were not adopted to any extent until the 17th century.

PRIZE STUDIES OF TORNADES.

THE *American Meteorological Journal*, desiring to direct the attention of students to tornadoes, in the hope that valuable results may be obtained, offers the following prizes:—For the best original essay on tornadoes or description of a tornado, 200 dollars. For the second best, 50 dollars. And among those worthy of special mention 50 dollars will be divided. The essays must be sent to either of the editors, Professor Harrington, Astronomical Observatory, Ann Arbor, Michigan, or A. Lawrence Rotch, Blue Hill Meteorological Observatory, Readville, Mass., U.S.A., before the 1st day of July, 1889. They must be signed by a *nom de plume*, and be accompanied by a sealed envelope addressed with the same *nom de plume* and enclosing the real name and address of the author. Three independent and capable judges will be selected to award the prizes; and the papers receiving them will be the property of the Journal which offers the prizes. A circular giving fuller details can be obtained on application to Professor Harrington.