ABSTRACTS

I.—VITREOUS HAEMORRHAGES


(1) Fuchs here records the anatomical changes which he observed on examination of a large number of vitreous haemorrhages of spontaneous or traumatic origin, dealing with these changes with regard to their situation, the appearances of the extravasated blood, and the processes of reaction and absorption.

1. Situation.—After referring to haemorrhage on the outer surface of the vitreous and its special features in the postlenticular and orbicular spaces, and between the vitreous and retina, he deals with haemorrhages into the vitreous itself. These may be (a) in rare cases confined to the outer limiting layer, the blood corpuscles being arranged in rows in conformity with the lamellated structure of this layer, or (b) spread immediately under it. In this case the haemorrhage usually comes from the ciliary region, and if it is of considerable amount may spread out in the form of a cup; here the blood corpuscles are often arranged in layers, although not with the same regularity as within the outer layer. The haemorrhage may (c) penetrate into the interior of the vitreous; the lamellar arrangement of the blood is then less frequent, as it tears through the framework of the vitreous, and spreads out irregularly, unless it finds its way into pre-existing spaces, such as the hyaloid canal, spaces arising from liquefaction of the vitreous or the entry of a foreign body. Where there are no such spaces the blood may be more or less sharply defined from the vitreous, or the erythrocytes form irregular strands in the adjacent tissue.

As regards the structure of the framework of the vitreous, Fuchs is of opinion that the regular arrangement of the erythrocytes in the marginal layers and interior of the vitreous (e.g., round the central canal) can only be explained by the presence of a series of membranes; according to his view the framework is composed of membranes which spread out from the vitreous base at the orra serrata in a fan-like arrangement forwards and backwards, with attachment to the limiting layer in front and behind, and between these towards the centre of the vitreous. Of the latter, those in front run inwards in a curve, with its convexity directed forwards, those behind are curved convexly backwards, while the lamellae
between these have a more or less straight course inwards. To this statement there is this reservation that the lamellae are less regular and often absent in the centre, especially in advanced life; while the central canal is enclosed by lamellae arranged concentrically around its sagittal axis.

2. The changes in the haemorrhage.—The author refers to its coagulation, and the appearances of the blood plasma, and the red blood corpuscles. The latter may be normal or exhibit changes in form (as the result of shrinkage, swelling, or haemolysis) and in their staining properties.

Haemolysis, i.e., the exit of haemoglobin and lipoid from the corpuscles, is the change most frequently observed in these cells, but the cause of it, whether it is due to a diminution in the osmotic pressure or the presence of haemolytic substances or the death of the cells from lack of oxygen, is not clear. This process takes place within a month after the haemorrhage appears in the vitreous, but it does not occur uniformly, the shadow cells being either distinct from, or mixed up with, normally staining corpuscles. The material leaves the erythrocytes in solution, and is then either precipitated between the shadows in the form of granules which show the same variation with eosin or Weigert as the corpuscles themselves, or spreads by diffusion throughout the vitreous and is carried away by the lymph. The author describes in detail the variation in the appearances, distribution, and staining of these granules, and emphasizes the relation between haemolysis and their formation.

3. Reaction and Absorption.—There is no reaction in the vitreous as a result of the presence of the haemorrhage, or its derivatives. Any reaction that takes place comes from the inner coats of the eye through substances which pass from the haemorrhage to the vitreous and reach these layers, setting up a chemotactic irritation which leads to mobilisation of the cells of the ciliary epithelium, migration of white blood cells, and the formation of new tissue.

The absorption of the blood is in part effected by phagocytosis—the distribution, number, and limited action of the phagocytes on the erythrocytes and granules is described—but in the case of large haemorrhages absorption is due more to haemolysis and the formation and removal of the granules above mentioned, or, where the haemorrhage is traversed by connective tissue, the gradual disappearance of the corpuscles enclosed in its meshes.

The formation of connective tissue begins from the ciliary body or retina, and is more likely to occur when besides the haemorrhage there is some inflammatory reaction. It was seen first fourteen days after the occurrence of the haemorrhage in the form of fibroblasts going in towards the blood, then in between the corpuscles to form long narrow threads or membranes. In other
cases the connective tissue is developed on the surface of the haemorrhage making a membrane round it. This formation of tissue may go on with or without phagocytosis.

THOS. SNOWBALL.

II.—THE TREATMENT OF RETINAL DETACHMENT


Verhoeff, having found the numerous procedures, operative and otherwise, suggested for the treatment of retinal detachment, of little or no use, brings forward a new method which has proved successful in a case recorded by him. He describes his procedure as follows:—"The retina is first replaced by means of scleral puncture or other measures, and the patient is then kept in bed with both eyes bandaged for about a week. A large number of minute punctures through the sclera and retina are now made by electrolysis. At the site of each puncture the retina becomes intimately fused with the choroid. The procedure may be carried out under cocain anaesthesia and is not actually painful, although very unpleasant to the patient. I have employed a small steel half-curved eye needle, the current being obtained from a series of six dry batteries of \( \frac{11}{2} \) volts each. The positive electrode in the form of a wet sponge is applied to the cheek. The conjunctiva is not dissected back, but the punctures are made directly through it. The slight conjunctival reaction resulting is of no importance. The needle point is pressed firmly against the globe until it penetrates the wall, when it is pulled back slightly so that the point protrudes only a millimetre or two into the vitreous and then allowed to remain about five seconds. . . I have selected the equatorial region for the sites of the punctures, but further experience may show that they should be made elsewhere. Their number probably should be varied according to the extent of the operation (in the case recorded, fifteen were made), but in any case it would seem advisable to make a few punctures also through the normal portion of the retina as a prophylactic measure. The patient is kept in bed for about ten days afterwards to allow time for the retina to become firmly adherent."

Perfect results can only be expected from the electrolytic punctures when the retina is previously completely in contact with the choroid, although possibly some benefit might accrue even in cases where the retina is still partly separated. For the preliminary replacement of the retina, Verhoeff finds simple scleral puncture
"with counter-pressure on the globe to force out the last trace of fluid possible," the most satisfactory.

The method may also prove of value as a prophylactic measure to be used on the uninvolved eye in cases of non-traumatic unilateral separation, particularly in cases of high myopia.

J. Jameson Evans.

III.—"SNOWBALL" OPACITIES OF THE VITREOUS


Holloway gives an account of those peculiar "snowball" opacities of the vitreous described by A. H. Benson (Trans. Ophth. Soc. U.K., Vol. XIV, 1894, p. 101) as "asteroid hyalitis" on account of their close resemblance to the stars on a clear night.

The opacities are globular or ellipsoidal in shape, of a dull white colour, not glittering, and some may show a slight projecting spur. They usually manifest but a limited range of movement and tend to return to their original position after excursions of the eyeball. They may be present in certain portions of the vitreous or pervade the whole of that structure. The reduction in vision is certainly less than might be expected.

Holloway gives details of four cases, two males and two females, aged 74, 73, 53, and 50 years respectively. The opacities were limited to one eye in three of the four patients. Sight in the eyes affected was 5/60, 5/4, 6/6, and 6/7.5. Complications included opacities of the lens, retino-choroidal disturbance, and retinal haemorrhage.

Analysing the thirteen cases of snowball opacity found in literature Holloway found that eight were males and five females, and that eleven were over fifty years of age. In a couple of instances both eyes were involved. The associated ocular conditions included lental opacities, signs of inflammation of the uveal tract, optic atrophy, glaucoma, and detachment of the retina.

There is a striking clinical resemblance between the cases described and those showing cholesterol crystals in the vitreous, and Holloway suggests "that the snow-white opacities are formed during the same or similar process that has to do with the deposition of cholesterol in the vitreous." He agrees with all other observers, however, that the snowball opacities are not composed of cholesterol.

S. S.
IV.—FUNCTIONS OF THE RODS AND CONES


In this paper Rochon-Duvigneaud gives the results of his histological observations on the rods and cones of certain animals of the saurian tribe, in which some members of nocturnal habits are contrasted with others of diurnal habits. For example, in the Moroccan tortoise retina, thanks to the special properties of osmic acid, one can see that each cone is provided with a black spherule, which is absolutely confined to the cones and does not exist in the rods. If all the terminal elements show this black dot, then we are dealing with cones only, and rods are absent. This point is well brought out in the retina of the green frog where one can readily see the rods and cones quite distinct, not only by their length and shape but by the presence of the black spot which shows up all the cones. With this point in view Rochon-Duvigneaud proceeds to the study of a diurnal saurian, the chameleon, where the perceptible elements all possess the black dots, and there are no other elements but very fine cones at the centre getting larger and larger towards the periphery. The retina of the green or the grey lizard shows this even more clearly—the more conspicuous cones are easily seen with the black spot in each, all over the retina, and not a single rod. The diurnal saurians i.e., the great majority of the saurians, have nothing but cones. There is, however, one family of nocturnal saurians, that of the geckos, and it has nothing but rods. The gecko's retina, prepared as the other and treated with osmic acid, shows the outer portion of the rods to be broken up into blackish lamellae piled like coins, entirely due to the reagents—an artefact. There is no black spot seen anywhere, merely rods, and these double and simple alternating. Thus a nocturnal member of this group has nothing but rods, whilst the more numerous diurnal ones possess only cones.

Comparison between the gecko and the chameleon eye shows that the former is specially adapted to night work while the latter is the acme of adaptation to daylight vision, smallness of cornea being extremely well marked. The human cornea occupies 60 degrees of the circumference of the eye, that of the chameleon 33 to 35 degrees, while its pupil is small, circular, and apparently devoid of all mobility, being affected neither by differences of light, nor mydriatics (atropin, strophanthin), destruction of the brain by needle, nor death. Its size suggests a miosis. The chameleon eye then is
specially suited for clear vision and this is supported by the presence of the highly developed fovea, extremely rich in cellular elements and provided with a central bunch of cones of an almost incomprehensible minuteness; in fact, the eye is a regular microscope. The eye of the gecko, on the other hand, shows all the points of adaptation to nocturnal vision—large cornea with an angle of 110 degrees, as in the various owls. The vertical slit-like pupil is very mobile and surpasses that of man, in fact, more resembles that of birds. In dull light it becomes widely oval or nearly circular, like the cat's, while in a bright light it shuts itself, the notched pupil edges engaging so as to exclude all light. Rochon-Duvigneaud suggests that the oval pupil of the animals that see in the dusk is better adapted for complete closure against bright lights than the round pupil. The gecko's posterior pole shows no attempt at a fovea whereas that of the chameleon is extremely highly finished, so that the gecko has presumably no central vision. Hidden away in crevices by day it pursues insects after dark with a marvellous agility, thanks to their movements, no doubt, rather than to their form.

As Ranvier observed, the gecko has visual purple, but its quantity, or at least the intensity of its colouration, is much less than in the frog, where it appears as blood-red in the retina of an animal coming out of the darkness. Rochon-Duvigneaud found with Ranvier that the gecko's retina after three days in darkness showed much less red than that of a frog under the same conditions.

Judging from the gecko, then, vision in a dim light depends on the rods, but do other animals of nocturnal habits show any support to this idea? The tortoise works at night and his retina has nothing but cones, but Rochon-Duvigneaud suggests that the tortoise may really use his olfactory sense to tell the plant or insects which are within reach of his neck. It is not suggested, however, that the cones are not used at all in dull light; it is purely relative.

It is not only the number but above all the length of the rods which increases (as Schultze had already noted in 1866) in the animals best adapted to nocturnal vision, i.e., the external segments of the rods are increased in size. The more this mass is thickened or the thicker this mass is on a given surface, the better will it realize the transformation of luminous vibrations into nerve stimulus. That is in accord with the current theory on the functional value of the purple, which is more abundant, as the substance holding it has more volume.

This hypothesis agrees still with the smallness of the outer segments of the cones in the exclusively diurnal animals, such for example as the chameleon; in the lizards of our climate, whose cones are in general more bulky than those of the chameleon, the inner segment is very thick, the outer extremely small. It is so
also in the ring adder and the asp, viper, etc. The intense luminous vibrations would find in an external segment, little in bulk, a sufficient receptor, the feeble vibrations could not be utilized but by a grand mass of this same substance.

It is not then in the retinal structure that one must seek for dispositions susceptible of augmenting or diminishing the luminous sensibility, but solely in the mass of the vitreous substance constituting the outer segments. In other words the luminous vibrations will be taken up with much more efficacy as the external segments of the light-receiving elements are longer and form a very thick layer. This fits in with the phenomenon, well known in human vision, that the minimum light perceptible keeps the same right up to the limits of the visual field, although the retina simplifies itself enormously towards the periphery, while the external segments of the rods preserve their length right up to the ora serrata.

W. C. Souter.

BOOK NOTICES


Only four years have elapsed since the last edition of this well known text book, consequently no great alterations have been found necessary. It contains 27 additional pages and over a dozen new illustrations. A very brief account of Gordon Holmes's views on the cortical centre of vision is given in the chapter on neurology, but neither his name nor any indication of the matter is to be found in the index, although alluded to in the preface. From the student's point of view the book is tending to get rather large and costly, but can be confidently recommended as a reliable guide to the beginner in ophthalmology.

E. E. H.

Revue Générale d'Ophtalmologie. August-September, 1914.

We welcome the reincarnation of the Revue Générale d'Ophtalmologie after its suspension during the war. The number just received is dated August-September, 1914; it contains no original articles, and all its abstracts are from pre-war literature. The next two or three numbers will be brought out by the old editors, Professors Rollet, Truc, and L. Dor. On and after January, 1920,