

Net-like degeneration of Bowman's membrane

A. J. BRON* AND D. B. JONES†

Moorfields Eye Hospital, London, E.C.1

The purpose of this paper is to report an unusual disorder of Bowman's membrane.

Case report

A 66-year-old woman was admitted to hospital with right periorbital cellulitis. The condition was due to a maxillary sinusitis and responded to antibiotics.

It was noted that each eye showed an unusual pattern affecting the superficial cornea at the level of Bowman's membrane. Visual acuity, eye movements, and intraocular pressure were normal and the globes apart from the corneae appeared entirely healthy. Corneal sensation was normal. The appearance of each cornea is described separately below.

RIGHT EYE

The cornea appeared normal by diffuse illumination. With focal illumination using an intense broad slit beam, an irregular patch of anterior crocodile shagreen (Vogt, 1930) was seen over the axial cornea. This comprised a mosaic of opalescent polygonal islands lying at the level of Bowman's membrane. Each island was separated from its neighbour by a thin clear interval. The shagreen seen in this cornea differed, however, from that usually described, for within the clear zone between the polygons a further band could be discerned. This was a very narrow, slightly irregular line running centrally and dividing the clear zone into two clear parallel bands. The central line was opalescent like the polygons themselves. On retro-illumination, the anterior crocodile shagreen was no longer visible, but the bands between the polygons were seen particularly well as a reticular pattern the extent of which corresponded to that of the crocodile shagreen itself. They both appeared to be at the level of Bowman's membrane. Any given portion of the reticulum was made up of two double-contoured bands lying side by side. The contours themselves appeared as dark lines against the bright yellow-orange background light reflected from the iris. Each band was segmented by the presence of a sequence of round or oval blister-like areas lying in line. At times the parallel bands appeared to twist across each other and also to form knots at junctional points in the reticulum (Figs 1 and 2, opposite).

The most satisfactory view of the reticular or net-like pattern was obtained against the red reflex with the pupil dilated. No new features became apparent.

LEFT EYE

This eye too showed an irregular patch in Bowman's membrane. A net-like pattern was easily seen by retro-illumination, the features of which were basically the same as those in the right eye. The bands of the pattern, however, showed greater segmentation by round blister-like irregularities and these were scattered sparsely outside the confines of the reticular bands, within the polygons themselves. No anterior crocodile shagreen was present.

An observation was made in each cornea, which seemed to have an important bearing on the genesis of the net-like disorder. The pattern of the disorder corresponded exactly to the overlying

Received for publication January 6, 1969

Address for reprints: Moorfields Eye Hospital, City Road, London, E.C.1

*Resident Surgical Officer, Moorfields Eye Hospital

†Research Fellow, Department of Ophthalmology, Bascom Palmer Eye Institute, University of Miami School of Medicine, Miami, Florida, U.S.A.

Supported by a Public Health Service Training Grant NB05277-08 from the National Institute of Neurological Diseases and Blindness, Bethesda, Maryland

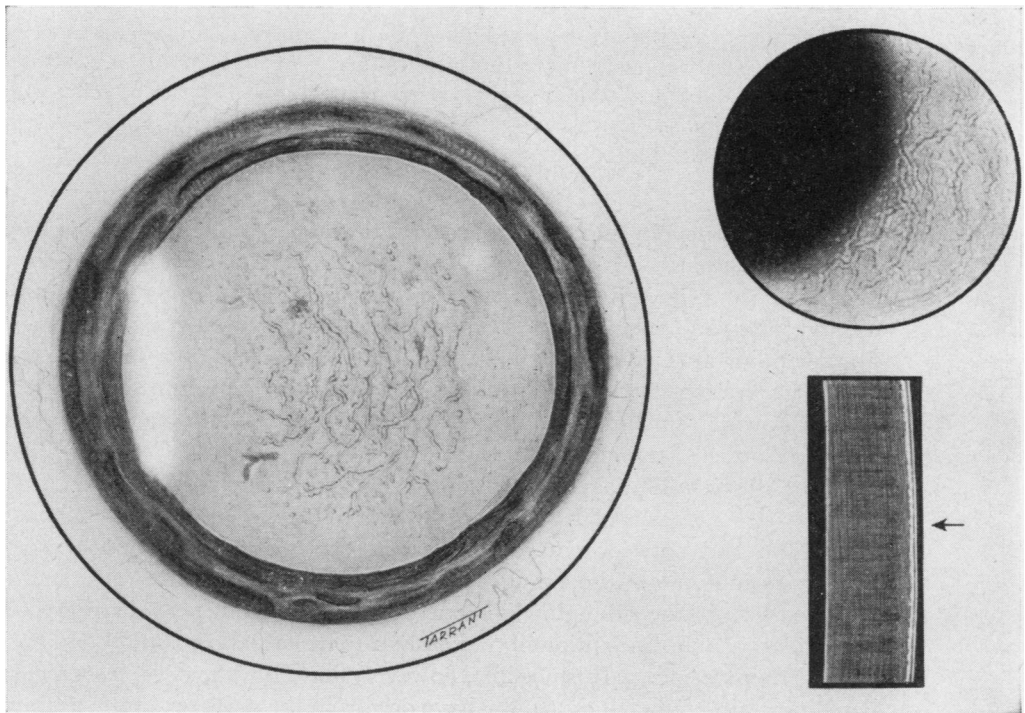


FIG. 1 *Drawing of the right cornea. Left-hand side against the red reflex; upper right inset retro-illumination from iris; lower right inset, slit section*

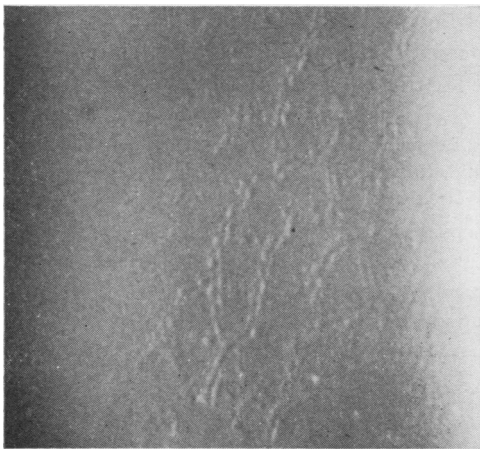


FIG. 2 *Net-like degeneration in right cornea seen against the red reflex. Zeiss photo slit-lamp picture*

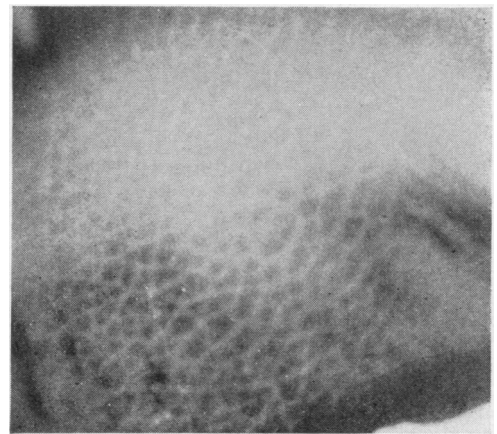


FIG. 3 *Anterior corneal mosaic demonstrated in the right cornea in the presence of fluorescein*

anterior corneal mosaic (Fig. 3). The anterior corneal mosaic (Bron, 1967, 1968) is a polygonal pattern which may be induced over the surface of any normal cornea by lightly rubbing the upper lid up and down over the corneal surface, when it may be demonstrated in the presence of fluorescein (Schweitzer, 1967) or against the red reflex.

The epithelium of each cornea was smooth.

In addition to the features described above, there was mild cornea farinata in each eye, and both corneae showed occasional "fingerprint lines" (Guerry, 1950), a few tiny grey-white intraepithelial spots reminiscent of those seen in staphylococcal allergy (Jones, 1960), and mild peripheral anterior crocodile shagreen.

Discussion

Apart from its novelty, this unusual corneal disorder is of interest because the morphology of the net-like pattern is the same as that of the overlying corneal mosaic.

It has been suggested that the anterior corneal mosaic is due to a structure either in or around Bowman's membrane. Recent studies suggest that it may be due to bundles of fibres running at the surface of Bowman's membrane (Bron and Tripathi, in preparation). The degeneration described in this paper appears on slit-lamp examination to lie at the level of Bowman's membrane, and it is tempting to speculate that the degeneration represents a disorder of the mosaic structure itself.

In the differential diagnosis, two other conditions may be considered. The superficial reticular degeneration of Koby (1927) shows some similarities, but in this condition the epithelium and anterior part of the stroma are affected, and vision is reduced. The hereditary sub-epithelial corneal dystrophy of Thiel and Behnke (1967) exhibits a honey-comb pattern in the sub-epithelial zone of the cornea, but here there is a greater opacity of the cornea and diminution of vision, and there are also painful episodes in youth due to recurrent erosions. It is possible, however, that both the net-like degeneration and the hereditary sub-epithelial dystrophy have origins in the same structure, as their morphology is similar.

Summary

A bilateral, net-like degeneration of Bowman's membrane is described. The differential diagnosis is discussed, and it is suggested that the reticular pattern of this disorder has its origins in that structure responsible for the anterior corneal mosaic.

Our thanks are due to Prof. Barrie R. Jones, for giving access to his patient, and to Mr. T. R. Tarrant, of The Institute of Ophthalmology, for the corneal drawings.

References

- BRON, A. J. (1967) *Arch. Ophthalm. (Chicago)*, **79**, 119
 ——— (1968) *Brit. J. Ophthalm.*, **52**, 659
 ——— and TRIPATHI, R. C. In preparation
 JONES, B. R. (1960) *Trans. ophthalm. Soc. U.K.*, **80**, 665
 KOPY, F. E. (1927) *Arch. Ophthalm. (Paris)*, **44**, 149
 GUERRY, D., III (1950) *Amer. J. Ophthalm.*, **33**, 724
 SCHWEITZER, N. M. J. (1967) *Arch. Ophthalm. (Chicago)*, **77**, 548
 THIEL, H. J., and BEHNKE, H. (1967) *Klin. Mbl. Augenheilk.*, **150**, 862
 VOGT, A. (1930) "Lehrbuch und Atlas der Spaltlampenmikroskopie des lebenden Auges", 2nd ed. vol. 1, p. 114. Springer, Berlin