unsuitability of the Bantu as a race for following pursuits which entail much accurate, frequent and persevering near work.

Summary

A new conception of convergence is proposed. This conception does away with current ophthalmological opinion on convergence.

The new conception of convergence affects the diagnosis of asthenopia. It displaces the centre of gravity in that diagnosis from the static factor of monocular refraction in the direction of the kinetic factor of functional binocular ability.

An important physiological difference was found in this function between the Bantu and the European.

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TWO RARE CORNEAL CONDITIONS

- I. Acute Conical Cornea
- II. Keratoconus Posticus Circumscriptus

BY

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Case I

FUCHS (*Lehrbuch der Augenheilkunde*, 14th Ed., p. 408) mentions a condition which he calls *acute conical cornea* and describes it in the following words:—"The alteration in the curvature of the cornea sometimes causes spontaneous rupture of Descemet's membrane and its endothelial lining. Then the aqueous seeps into the corneal parenchyma causing it to swell and become cloudy.

The keratoconus shows a white-grey opacity over a large surface, and rapidly bulges forward; while the neighbouring tissues become thicker. After a time the endothelium regenerates, covers the rift, and again seals off the corneal parenchyma from the aqueous. The cornea slowly regains the appearance it exhibited before the development of the tear. The edges of the rupture alone remain visible as fine white lines."

The following is probably an example of this process:—

S. G., aged 28 years, came to the Eye Department of the Coventry Hospital on October 1, 1928, complaining that he had something in his eye. Examination showed a "rust ring" near the centre of the left cornea. There was no history of any accident, but as the man was a miner, the foreign body was probably coal or rock. The foreign particles were scraped off, and on October 3 a note was made that the abrasion was still present on the cornea.

The acuity of the right eye was 2/60 not improved by spheres, that of the left was 6/36 c. — 2.0 D. sph. = 6/18. Both fundi showed early posterior staphylomata and the tigroid appearance of high myopia.

No note was made of the condition of the corneae, but, as they were both examined, it is certain that no obvious conical cornea was present.

The patient was suffering from the effects of a foreign body, and his refraction was merely tested in the routine manner by the sister. He was told to come again when the irritation had subsided to have a proper estimation made of his refraction, but he did not reappear till December 15, 1930, two years later.

He now had a fully developed conical cornea of the R. eye quite typical in appearance. The cone was acute with a sharp apex, where there was a very obvious nebula.

The visual acuity of the right eye was now reduced to hand movements. The acuity of the left eye, the eye that had been injured by a foreign body, with — 4.0 D. sph., and — 4.0 D. cyl. at 80° was 6/18.

In two years the right eye had developed a conical cornea and the refraction of the left had altered considerably.

Examination with the slit-lamp showed that the conical cornea had nothing in common with the orthodox variety. The right cornea was enormously thickened at the apex of the dome. There were large cavities under the epithelium, which did not raise it above the common surface. At the base of the cone, in the region of Descemet's membrane, there was a large bleb, which was seen only by retro-illumination. The left cornea had superficial opacities here and there, and in the region of each opacity the cornea was thin. There was no suggestion of any ectasia of the left cornea, or of keratoconus.

The appearance of the right cornea is shown in Fig. 1. The extreme thickening of the apex of the cone is obvious. The spaces under the epithelium are seen, and at the posterior surface the large bleb, seen only by retro-illumination. No details are shown in the region of Descemet's membrane because this was obscured by the density of the apex.

Fig. 2 pictures the left cornea, and shows the irregular thickness and the areas of sclerosis, which appear as nebulae by oblique illumination. Both corneae are in "optical section."

On January 5, 1931, the patient appeared again. He had developed a small ulcer at the apex of the cone, with some circum-corneal injection. This rapidly healed under appropriate treatment. Unfortunately I did not see the patient myself at this time, and no examination was made with the slit-lamp.

On March 31, 1931, the left eye was again examined for refraction with the following results:—V.L., c. - 4.0 D. sph., - 2.0 D. cyl., axis 90° = 6/9 partly. It is remarkable that such a distorted cornea allowed such good acuity. Here again the case came up on a day taken by my assistant and I had not the opportunity of examining him with the slit-lamp.

FIG. 1.

FIG. 2.

On August 17, 1931, I examined him and found a remarkable change. The conical cornea was present as at the first, but the apex was not so acute. The slit-lamp showed that all the thickening had disappeared. There were no blebs and no spaces under the epithelium. The cornea had exactly the same appearance under the slit-lamp as the left cornea. It was irregular in thickness, but on the whole thinner than a normal cornea. The only difference was that the right cornea showed a fully developed keratoconus whereas the left had a normal shape.

The right fundus could be seen only with difficulty and no detail could be made out. The vision had fallen to perception of light.

It seems obvious that the changes which took place in each cornea were fundamentally the same, but that in the right a rupture of the endothelial layer had taken place which led to the acute keratoconus.

Case II

At the Oxford Ophthalmological Congress in 1930 I read a paper describing certain anomalies of the posterior curvature of the cornea which I called keratoconus posticus. This condition is characterized by a perfectly regular, geometrically precise increase in the curvature of the posterior surface of the cornea, giving a cornea that is much thinner in the centre than it is at the periphery. The paper will be found in the *Transactions of the Ophthalmological Society*, Vol. L, p. 551.

After the Congress I received a communication from Mr. P. L. Stallard describing a case in which the alteration in curvature was confined to the central part of the posterior corneal surface.

He had examined in India a middle-aged Mahratta who had in one eye an acuity of only 6/24. There was a confused whirling retinoscopy reflex. The Placido rings were quite circular, and the reflections of the keratometer mires were regular. The narrow beam of the slit-lamp showed a central corneal anomaly. It was best described as the appearance that one might expect if into the posterior surface of a plastic cornea one had excavated a subsidiary small basin-like depression by pressing into it a marble of much smaller diameter than that of the corneal surface. This basin occupied about half the corneal area, and its surface appeared to be a perfect curve. As this man was a railway worker, and would have his sight examined on entry, it is probable that the condition was acquired.

One would imagine that a case of this kind was almost unique, but on October 22, 1930, I discovered another.

W. S., aged 29 years, came to the Eye Department of the Coventry Hospital asking for glasses.

The right eye had been removed three years previously after a blow with a spanner.

The acuity of the left eye was 6/12. He said that he saw better with a +2.0 D. cyl., axis 30°, but he did not read more than 6/12 with this correction.

Retinoscopy, performed without a cycloplegic, was difficult owing to the distortion of the shadow, and to a central "optical opacity," a horse-shoe like central shadow, open above. The retinoscopy appeared to give +2.5 D. in one meridian, +4.5 D. in the other.

The fundus was perfectly normal and was seen with ease. There was no paralactic distortion. I thought that perhaps the retinal sheen was exaggerated for the man's age.

FIG. 1.

FIG. 2.

Examination with Placido's rings showed no distortion, and no abnormality could be seen by examination with the loupe and oblique illumination.

Examination with the narrow beam of the slit-lamp revealed a condition similar to that described by Mr. Stallard, except that the basin-like depression was smaller and not quite central.

Careful focusing showed that there was slight flattening of the external corneal surface opposite to the posterior basin, and that there was some sclerosis of the cornea in this region. The appearance of the cornea seen in optical section is shown in Fig. 2. Fig. 1 shows the situation and extent of the bowl.

I have recently re-examined the case, after an interval of nearly a year. The flattening of the anterior surface is now easier to define, and the angle of the cylinder has altered. The present refraction is: V.L. c. -2.0 D.cyl. at 180° = 6/9 partly.

No abnormality can be detected with the ophthalmoscope.

The patient now remembers that about four years ago he had a splash of hot lead into the left eye. He was at work next day and felt no ill effects from the accident.

It is striking that in Mr. Stallard's case the acuity was 6/24 and in mine 6/9 partly. The explanation must be that the refractive index of the cornea is so near to that of the aqueous that irregularities of the posterior surface have not a great effect upon the refraction. A very small irregularity of the anterior surface causes great distortion because the difference between the indices of the air and the cornea is great. In spite of this explanation it is surprising that a large bowl-shaped depression which was not even centrally placed should allow an acuity of over 6/12.

It is difficult to be quite certain that any change took place in the cornea during the year that it was under observation, but a year ago I did not notice the flattening of the anterior surface. The case was shown to the Midland Ophthalmological Society and my colleague, Mr. Rudd, thought that it was present. To-day it is obvious, and so it is probable that a change has taken place. The alteration in the angle of the cylinder and the improved acuity is further evidence of change. The presence of an area of sclerosis in this part of the cornea suggests that the anomaly is due to contraction, and this must probably be ascribed to some inflammatory process induced by the lead burn. Judging by my drawing made a year ago, and the present appearance, I think that the bowl is now less steep and that the edges shelve off more into the surrounding cornea than they did at that time.

SPONTANEOUS CURE OF CATARACT

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It is well known that changes may take place in a nuclear cataract which end in restoration of sight, but it cannot be often that all the stages of this transformation have been observed.

I have already recorded one example of this process in "An Illustrated Guide to the Slit-lamp," p. 85. Here the nucleus of a cataract had diminished in size, and the whole of the cortex had become fluid, with the result that the nucleus dropped below the line of sight, and the patient obtained with a suitable spherical correction an acuity of 6/18.

The following is another example:—

Mr. A. B. consulted me in my rooms on March 24, 1914.

The right lens had been extracted by Mr. Fulford Eales in June, 1913. The vision of this eye, with suitable correction, was 6/5 partly. The media were clear, and the fundus normal in all respects. The left eye contained a mature cataract. I made no note of anything unusual in its aspect.