X-rays. This tumour, though it had given rise to intraocular metastases, had not invaded the optic nerve. Although Verhoeff had not the opportunity to verify this tumour histologically he thinks there can be little doubt that it was a glioma. Although it persists yet the child's vision following the X-ray treatment appears to be perfect for the $3\frac{1}{2}$ years following treatment.

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CENTRAL SCOTOMA IN ANTERIOR UVEITIS*

BY

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At the Manchester meeting on October 14, 1921, I read a preliminary note on this subject and showed a case (No. 1).

The disease is that frequently described as irido-cyclitis with the so-called keratitis punctata. I do not wish to attempt to deal either with its causation or its treatment, both of which are obscure, but rather to record some personal observations on the occurrence of a definite central or paracentral scotoma. The scotoma in the cases recorded is not due to any diseased state at the posterior pole which the ophthalmoscope would reveal.

The scotoma may be relative or absolute, evanescent or permanent.

The explanation is as yet not quite clear. At present my view

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is that the scotoma is due to a toxic influence on the retinal elements at the macula, and secondarily on the papillo-macular band of nerve fibres.

This theory does not seem too far fetched, for it is well known that toxic substances of either definite chemical combinations, or of the more elusive biochemical ones, an instance of which is found in diabetes, can produce a scotoma.

In my humble opinion, all forms of inflammation other than directly traumatic, affecting the uveal tract are due either directly or indirectly to micro-organisms or toxins, and it would not be surprising if the same toxin were to damage the retina or the papillo-macular bundle.

I have not gone fully into my private records, but have in mind the four following cases.

I am of the opinion that in a proportion of the others where the visual acuity has been considerably lowered without obvious reasons apparent in the media, a central scotoma would have been found had the idea occurred to one to examine for it.

I propose making a fuller investigation at a future date, but the four serve to illustrate the point.

Case I—Female, now aged 34. The history is long, as she has been under my care since 1907.

When first seen on September 20, 1907, the left eye had been affected six months, but had had no treatment beyond a lotion. She had had no definite illness, although she had been always a delicate child. The father had died of phthisis.

The R.V.=6/6. No Hm. J. 1 and the L.V.=hand. The diagnosis of left iridocyclitis was made at once. "K.p." was marked in left eye on January 3, 1908. The right eye showed some haze in the media and irregularity of the pupil, but the vision was 6/6. The left eye was tender. No red reflection. On January 28 left eye T + 1. Cornea finely pitted. *Iris bombé* above. Atropin and dionin were used locally. On January 7, 1908, the right eye presented some "k.p.," but the left eye had improved. The iris was now in normal position, not *bombé*, and the details of the fundus visible.

Ten months later, i.e., in December, 1908:—

R.V. = 6/24 $\bar{c}$ + 1 D. sph. = 6/9 and J. 4.

L.V. = J. 20 $\bar{c}$ + 1 D. sph. = 6/60 and J. 20.

On November 16, 1909, right iris was *bombé*.

On February 3, 1910, R.V.=hand and L. with a weak + cyl.= 6/9 and J. 1. The right showed "k.p." and a dull red reflection only. Left eye haze on anterior capsule, pupil medium and fixed. No fundal disease.

On November 3, 1910, the R.V. had gone down to P.L. and

the L.V. was 6/6 partly and J. 1. So far, treatment had been with mercury, but in 1911 tuberculin emulsion was administered, and the injections were continued for many months. An iridectomy was performed on the right eye, hypopyon followed, and eventually the right eye was so tender and painful that it was removed. Attempts were made by tapping the anterior chamber of the left eye to find the micro-organism causing the lesion, but without tangible result.

The central scotoma was first noted on September 25, 1913, when the vision of the left eye had gone down to hand movements.

On January 5, 1914, L.V.=J. 20 with central scotoma. An indistinct patch of choroiditis was noted at the inner periphery.

CASE I.—Annie B., Oct. 28, 1921. Peripheral field for white.

In 1913, capsules of oleum caryophylli were administered for a long period, on the theory of an intestinal toxæmia.

Later, injections of salvarsan were given, and the patient always thought that her sight was helped thereby, but the Wassermann test was negative.

Now the condition is:—Left eye quiet, a little fine brownish "k.p.," pupil medium size, excluded with a finely serrated margin. A thin film covers the anterior capsule of the lens, but numerous very fine brown dots are scattered on it. The V.=6/36 and J. 10. The fundus and disc are easily seen; there is no pathological lesion.

The field, as taken by the perimeter, is moderately contracted (*vide* chart).

With Elliot's scotometer the field as taken by the small white bead is restricted to about 18° radius, but at the centre there is a large scotoma extending 5° to 8° from the fixation point.

As to the origin of the central scotoma here, I am inclined to regard it as being due to the toxin producing the iridocyclitis; but I feel, in justice to the theory, I must state that Mr. F. H. Westmacott, in 1914, reported rhinitis and hypertrophy of the middle turbinates, and recently he desired her to have an operation on the nose. Carious walls were found round the left sphenoidal sinus and thick cheesy pus in its interior. One cannot absolutely exclude, therefore, pressure on or infection of the optic nerve by the posterior ethmoidal or sphenoidal sinuses, and yet if that were the real cause one would expect the scotoma and consequently the sight to be worse now than formerly, but we remember in that

CASE I.—Annie B., Oct. 28, 1921. Scotoma for white.

year, 1914, the vision went down to hand-movements, and now it is 6/36 and J. 10.

Case II.—G. T. R., male, age 49. First seen August 1, 1917.

R.V. = 6/60 $\bar{c}$ + 0.75 D. sph. $\ominus$ + 1 D. cyl. ax. vert. = 6/24 and $\bar{c}$ + 2.25 D. sph. $\ominus$ + 1 D. cyl. ax. vert. = J. 10.

L.V. = 6/12 $\bar{c}$ + 1.75 D. sph. = 6/6 and with + 3.25 D. sph. = J. 1.

There was marked episcleral injection surrounding the right cornea, but confined to one patch at outer side of left.

Evidence in each eye of small dots of anterior choroiditis. No definite vitreous opacities seen. Very doubtful mottling of left macula. The sight slowly failed, and on November 4, 1920, R.V. = hand and L. 6/24 and J. 6.

On the 17th of the same month I found slight haziness of disc and fundus due to vitreous cloud, but no gross lesion present. Septic

teeth were removed. Dr. Arnold Renshaw reported on a blood count that there was a slight anaemia which might be attributed to bacterial infection.

On December 23 last year the L.V. had gone down to 6/60. A fairly large paracentral absolute scotoma was found by Bjerrum's screen above the fixation point. Of course it is possible that the patient actually fixed the central spot on the screen paracentrally, and the scotoma was really central.

The patient was only a moderate smoker, but tobacco was stopped.

Thyroid and salicylates have been given as well as vaccines. In March last the scotoma had become smaller.

The right field was only present in the form of an inverted quadrant above fixation point.

CASE II.—G. T. R., Dec. 23, 1920. Originally taken on a Bjerrum's screen.

Here again we have a scotoma with no macular lesion apparent to account for it.

Case III.—S. H. B., male, aged 52. First seen April 23, 1918. Had had iritis in left eye in 1906.

R.V.=6/12 and J. 8 and L.=6/18 and J. 1 when corrected by lenses. R. eye began to be inflamed four days previously. The left showed posterior synechiae and haze in media. The right had typical iritis. On May 6 right iritis was subsiding and patient did not return till October 29, 1920, stating he had been struck in the right eye by a fragment of coke. There was no evidence of trauma, but there were signs of old iritis with a recurrence, and on November 11 fine grey "k.p." was seen.

The acuity went down, and on November 26 a central scotoma for colour was found. Tobacco was stopped, and urine examined with negative result. No fundal lesion.

November 29, scotoma had enlarged and become absolute.

December 1, scotoma smaller.

December 9, further improvement. V.=J. 4, and by December 16 V.=6/9 and J. 1. No scotoma and no "k.p."

The cause in this case was possibly syphilis, but I did not suspect it from the clinical appearance, for I treated him with salicylates. Some friend of his sent him to a syphilologist, and he administered

CASE IV.—E. H. W., June 17, 1914. White.

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salvarsan, however, after the scotoma cleared up, so the patient told me. The disappearance of the scotoma and the "k.p." coincided.

Case IV.—Mrs. E. H. W., aged 45. First seen in February,

1911. Had suffered from, and still has very marked rheumatoid arthritis.

Left eye frequent attacks of redness.

R.V. normal. L.V. J. 20. Right eye healthy. Left eye, exclusion of pupil and grey fine "k.p."

I thought the irido-cyclitis might be due to intestinal sepsis, and advised a course of emulsion of lactic acid bacilli prepared by Prof. Walker Hall, of Bristol.

On August 28, 1911, I found a large sector-shaped scotoma extending above fixation point. Treatment: Aspirin and thyroid.

May 13, the large central scotoma was still present, and was somewhat positive. Guaiacol carbonate and soluroil.

On June 20, 1913, considerable "k.p." in right eye, and vitreous haze, although the acuity was still 6/6 and J. 1.

Teeth again examined, some pyorrhoea alveolaris found. Ol. cinnamoni given in capsules.

In August, 1913, patient saw Sir A. E. Garrod and Mr. Goadby. Vaccines were prepared and administered. Later, had radium water.

On June 17, 1914, R.V.=6/12 fairly, but L.V. showed very large central absolute scotoma. Red seen at inner and outer periphery, and green and blue at outer periphery only, although both described as green.

Right eye showed a small central scotoma for colour.

No fundal lesion except hyperaemia of discs, and distinct fulness of retinal vessels, especially the veins.

Anti-rheumatic phylacogen administered.

February, 1916, right eye: central colour scotoma persisted. Left eye: absolute scotoma as before.

March, 1917, same condition found.

In 1920 I met patient casually. She still complained of difficulty in any near work.

In all four cases, unquestionably, there was no accounting for the condition as being related to glycosuria. The second and third were smokers. In No. II no improvement took place on the cessation of a quite moderate use of tobacco. No. III quickly progressed from a small colour scotoma to absolute, and recovery was remarkably rapid.

I consider that quite possibly the moderate use of tobacco merely helped to accentuate the effect on the retinal elements, for both poisons, viz., tobacco, and the one I attribute the cases to, have, in my opinion, a similar action.

If all the improvement in No. III was due to tobacco cessation it is to be remarked that No. II did not recover in like manner.