Tobacco amblyopia in a woman, with anomalous scotomas / by G. E. de Schweinitz.

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TOBACCO AMBLYOPIA IN A WOMAN, WITH ANOMALOUS SCOTOMAS.

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ILLUSTRATED.

The following case is reported chiefly because of the somewhat unusual shape of the scotoma which was the distinguishing characteristic of the affection, and also because the clinical history indicates that the relation of alcohol to the development of the central amblyopia is practically eliminated as an etiological factor.

A married woman, aged 60, in good circumstances, of large frame and healthy color, presented herself on the 25th of November, 1896, with the following statement: Since June, 1896, vision has been slowly failing, and since July she has been unable to read. This loss of vision had been unaccompanied by pain or any external manifestation of ocular trouble.

Her history, obtained partly by questioning and partly from a letter written by her physican, Dr. J. Cardeen Cooper, is as follows, I quote his exact words: "The patient has always disobeyed the laws of health and has always been subject to excessive tax upon her nervous system: great mental anxiety, loss of sleep, late hours and irregular meals. Four years ago she suffered from enlargement of the liver, disturbed portal circulation and chronic bronchitis. This illness was followed by general neurasthenia and much indigestion. At this period of her history the urine contained, from time to time, traces of albumin and sugar. Under treatment these symptoms entirely subsided and specimens of urine recently examined were normal."

The patient is rheumatic in the vague sense in which this term is used, but has not been subject to inflammatory rheumatism. There is no history of severe illness other than the one detailed in Dr. Cooper's letter.

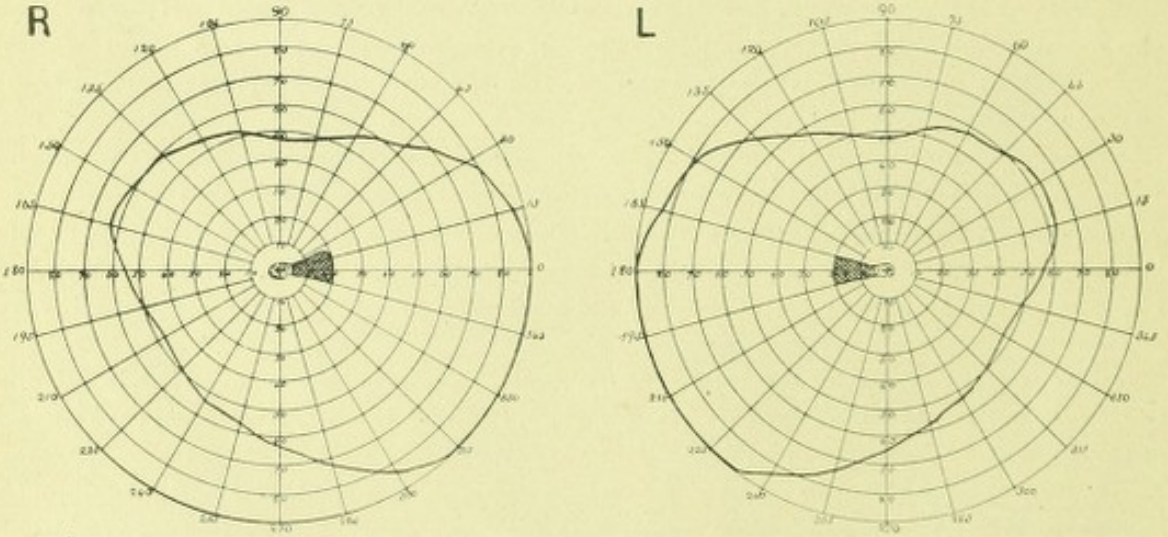
When 45 years of age, or 15 years before she sought advice, the patient began to smoke, at first only a few cigars a day, but for some years she has averaged at least six cigars during the twenty four hours, many of them being smoked late at night and during hours when she should have been asleep. It is probable that the use of the tobacco has been even greater than these words imply, as her daughter freely testified that she doubted if her mother had any idea how many cigars she smoked. The patient began to smoke to relieve, as she supposed it would, high tension of the nervous system brought on by insomnia, worry and domestic difficulties.

She does not use spirits in any form, is not an excessive tea drinker and takes no drug of any kind except digitalis, which has been prescribed in medicinal doses on account of a weak heart.

Vision in O. D. with + 1 D = $\frac{6}{12}$; with + 4 D added, D = 0.75 is read at 22 cm. with difficulty; no range. O. S. V. with + 3 D. = $\frac{6}{20}$; with + 4 D. added no ordinary print could be deciphered. The vision of this left eye has always been defective,—a defective sight associated either with some congenital amblyopia or arising from disuse in connection with high refractive error.

In the right eye the ophthalmoscope revealed faint haze in the lens periphery, a vertically oval disc with broadened scleral ring below and outward, a slight pallor of the outer quadrant of the nerve-head, arteries about normal in size, and veins somewhat distended and tortuous. In the left eye the lens was clear, the disc round, the scleral ring broadened inward, the central lymph sheaths full, the veins tortuous, the arteries normal and the lower and outer quadrant of the papilla slightly paler than its general surface. The macular regions were normal.

The peripheral fields were intact, but in the centre of each field there was a color scotoma for red and green as follows: It begins at five degrees to the temporal side of the fixing point, passes to 20 degrees on the horizontal meridian and to the same distance 15 degrees above and below this position (double cross-hatching in diagrams). In the space between 5 degrees to the temporal side of the fixing point and its nasal edge, the perception of color, red and green, is not lost but is duller than it is as compared with any spot within the area of normal color perception in the general field (dotted area in diagrams). These defects are almost exactly symmetrical, the scotoma being slightly broader on the right side than on the left. The area of the normal blind spot within each scotoma is recognized when examined with a small test-object. The scotomas were mapped with colored circles 1 and 2 mm. in diameter on a dead black surface.



Colors appear faded.
Scotoma red-green blind area.
Test-object 2 m m circle.

Fig. 1. and Fig. 2.

The patient was advised to discontinue tobacco absolutely, and to take strychnine and iodide of potassium. These directions were faithfully followed, and at the end of a month she reported with the vision of the right eye $\frac{6}{9}$ and ability to read 0.50 print. The area of red-green blindness previously described could not be detected even with the test-object only 1 mm. in diameter. The fog in the

center of the field of vision which had so annoyed her had practically disappeared. Ophthalmoscopic appearances seem to be unchanged. In the left eye the vision was as previously reported and the scotoma somewhat different in shape but still demonstrable. It begins outward and above at 5 degrees to the temporal side of the fixing point, passing then to 20 degrees. There is no scotomatous area below the horizontal meridian.

REMARKS.—Tobacco amblyopia is much more frequent in males than in females, not because the former are more predisposed, but because they are more exposed to the influence of tobacco. Indeed, Hill-Griffith is no doubt correct when he says that more cases would be found among women if the investigations of central visual defects were more frequently made, especially if search for color scotomata were more common. He records fourteen cases of toxic amblyopia in women. Berry has noted a number of instances and numerous others have been reported. This is the second case in my own experience in which I feel sure that tobacco was the prime etiological factor.

The typical scotoma in intoxication-amblyopia, according to my own measurements which closely agree with those of Sachs, is an oval with its pointed end towards the blind spot and its blunt end towards the fixing spot, to the nasal side of which it passes only slightly. The average measurements are outward 18 degrees, inward 3 degrees, upward 7 degrees and downward 6 degrees. This scotoma represents a red-green-blind area and commonly the extent of green blindness is greater than that of red, which in its turn may be surrounded by an area of imperfect color-sense. The "culmination spot," or "nuclear spot," in the language of Sachs, of the scotoma, lies horizontally from 1 degree to 8 degrees in a lateral direction from the fixing point, its breadth, vertically, being mostly below the horizontal line. Sometimes a small, easily over-looked scotoma exactly over the fixing spot is the beginning of the trouble. According to Groenouw's observations the typical egg-shaped scotoma results from the union of the scotoma from the fixing spot with a supplemental scotoma around the blind spot. The process may cease at this point or there may be progression characterized by an increase in the size of the color defect, usually above, until it meets the limit of the red field, that is the scotoma "breaks through," and if this goes on, the patient may eventually resemble a congenitally color blind person. In severe cases scotomas for blue and yellow form in similar manner to the red-green scotomas, and occasionally, especially in neglected cases, absolute defects are found within the relative area, and sometimes the entire

scotoma becomes absolute, although probably rarely in perfectly pure tobacco cases. Instead of the typical egg-shaped or oval scotoma the visual defect may pass up and out or down and out, or may be circular, or assume other shapes.[1]

In the present instance the indications are that there has been an anomalous development of the scotoma, either because the process in the macular fibres of the optic nerve has not followed the usual course, or else, which is not improbable, because the scotomatous process began around the natural blind spot and did not reach the fixing point, or, rather, that the union which Groenouw describes of the central scotoma and the supplemental scotoma did not take place owing to the failure of the perfect development of the former of these phenomena.

This type of scotoma is of some clinical importance, inasmuch as our ordinarily received ideas of the pathology of intoxication amblyopia, namely, that it represents a lesion in the papillo-macular tract which consists of an augmentation of nuclei, an hypertrophy of connective tissue and a wasting of nerve fibres, has recently been called in question by Nuel, who contends that the central toxic scotoma is not primarily a neuritis of the macular bundle but a disease of the macula lutea, causing degeneration of its cells, and that the optic nerve changes are secondary to the destruction of the nerve cells of the macula. In this connection it will be remembered that more than twenty years ago Schoen expressed the opinion (I quote from Sachs) "that the scotoma seemed to be the functional expression of the already great physiological weakness of the centre of the retina, heightened by chronic intoxication, to which condition were added certain physiological peculiarities affecting the sense of color, due to the pigmentation of the central retinal spot. In ancient cases, however, owing to continuous strain and abnormal mixture of the blood, certain material changes of the macula lutea might result, which would lead to ascending atrophy, marked by a change of color in the lateral half of the optic nerve."

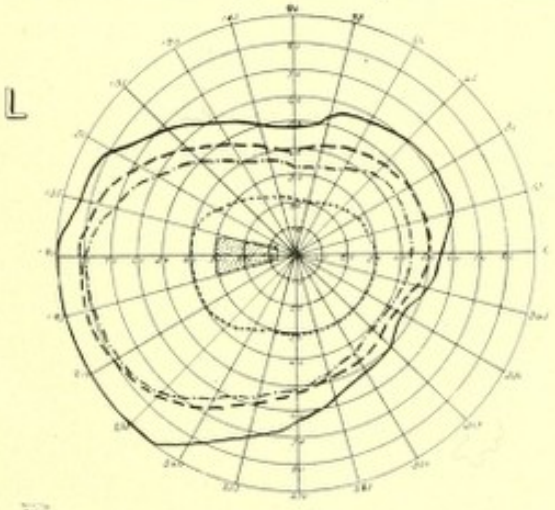
If the scotoma is due to macular changes it would seem, as Sachs has pointed out, that its relation to the vertical line should be symmetrical. This we know it is not. If the case which I report is to be classed as a tobacco amblyopia, and I think that it fairly may be so regarded, macular changes could hardly explain the present scotoma, which, indeed, so far as the red-green-blind area is concerned,

(1) See paper by the writer, Journal American Medical Association, Oct 31, 1896.

is displaced from that portion of the visual field which represents the macula.

There is, however, much to be said in favor of the macular origin of the central scotoma of tobacco amblyopia, both from the clinical and the experimental side. We know that destruction of the area of the macula by a coloboma, or by a patch of central retino-choroiditis, is followed by quadrant atrophy of the optic nerve. We know, too, that in a fair proportion of tobacco cases fine macular changes are demonstrable with the ophthalmoscope. These have been described by Nettleship, by Hill-Griffith, by myself and by other authors, although I confess that it never occurred to me that they had aught to do with the scotoma. Nettleship also regarded them only as coincidences. Experimentally, macular-fibre degeneration can be produced by properly placed retinal lesions, for example, by destroying the area of the retina between the macula and the optic entrance with the galvano-cautery and subsequently observing degeneration in the optic nerve fibres. A research of this character has recently been published by Usher and Dean.

Finally, I would call attention to an interesting point in connection with this case, namely, that one eye was congenitally deficient in visual acuity, representing that type which has sometimes been described as a "neglected eye." Now in this class of cases, in addition to the ordinary defective vision as measured with test-types, central scotomas are occasionally found, or at least, areas of central



Scotoma in an amblyopic eye with high refractive error.

Fig. 3.

depreciation of color sense.[1] In a certain number of them the sco-

(1) See paper by the writer in the Annals of Ophthalmology and Otology, Vol IV. No. 3. July, 1895.

toma, instead of being centrally placed, has a situation between 5 and 30 degrees to the temporal side of the fixing spot, as represented in the accompanying diagram,—a scotoma closely resembling the one which I report. Whether in the present instance there was a preexisting area of defective color-sense, which was intensified by tobacco poisoning and therefore retained its original shape, is a matter of pure speculation. It would seem, however, as the defect is symmetrical, and that the right eye, which was the seeing eye, is affected exactly as is the left which was the partially amblyopic eye, that not much information is to be gained from this point of view. Evidently the whole question of the formation of scotomas in toxic amblyopia is unsettled. We are not even sure that a perfectly pure tobacco case exists in the sense that there is no other etiological factor except tobacco. Therefore the record of each new case, with variations in the scotoma, is desirable. Much more to be desired is a continuation of the experimental work connected with this question. On this point I shall have more to say in a subsequent communication.