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COMMUNICATIONS

MIGRAINE*

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THE primary classical symptoms of migraine are the scintillating scotoma, followed by localized and usually unilateral headache, which culminates in nausea or in actual vomiting; but there are others which are generally recognized, and, as I have myself been the victim of migraine headache all my life, I can speak of at least two of them which are in my case constant. These two, apart from the extreme feeling of general depression, are:

- (1) A marked reduction in the pulse rate:
- (2) A striking increase in renal activity, which results in a copious secretion of pale urine.

In many migrainous subjects, one or more of the type symptoms may be absent, and personally I have never experienced any disturbance of vision. My headache is invariably localized in the same left temporo-frontal position, nausea is usual, and vomiting not infrequent. I have been subject to the trouble certainly from

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twelve years of age. Whereas in earlier life a night's sleep invariably ended the attack, the tendency in the last few years has been for the attacks to be a little less severe, but certainly of longer duration, so that at my present age of fifty-one, I am not free until nearly forty-eight hours after the onset. During my attack there is a certain amount of variation in the severity of the headache, and it is always very noticeable that when there is, for a short period, a mitigation in the severity of the headache, there is associated with it a slight increase in the pulse rate; at my worst, the latter has been to my knowledge as slow as forty-six beats per minute. All digestive and absorptive processes in the alimentary canal appear to be in abeyance in a severe attack, presumably in consequence of the lethargic circulation.

There is often a familial tendency in the disease; both sexes are liable; there is a periodicity about the attacks; my present interval is about fourteen days. In the female subject the attacks often coincide with the menstrual periods; they often cease during pregnancy, and usually terminate for good and all with the climacteric; in the male subject the liability to migraine commonly also ceases when the patient reaches about fifty years of age.

The migraine spectrum, on an average, lasts from twenty minutes to half an hour; the visual aura of epilepsy, on the other hand, for a few seconds only; the former is a lowly organized subjective visual phenomenon; the latter is a more highly perfected visual sensation, and presumably originates in the cortex of the visual centres, whence the disturbance rapidly spreads to the motor and sensory cortex. The migraine aura must have a different explanation. The migraine spectrum is always symmetrical: it may be represented by a scotoma expanding from the central point of vision: it may first appear in the temporal periphery of the fields, or affect the homonymous halves of the two fields of vision. If flashing light sensations appear homonymously, they will be followed by hemianopic loss of vision in the half fields implicated, and the headache will develop in the opposite side of the head.

The lowly organized visual spectra could, I conceive, be produced by irritation of the visual nerve fibres at the base of the brain; implication of them at the chiasma would explain the expanding central scotoma, or the bi-temporal scotoma. When one or other optic tract is involved, we should get the homonymous spectrum; presumably the crude impulse initiated in the basal fibres would be to some extent elaborated by the grey matter of the visual cortex.

That the hemicrania develops on the side opposite to the homonymous scintillating scotoma agrees well with the idea that the latter is initiated in the optic tract.

There appears to be only one region where a lesion, slightly varying in incidence, can reach the various parts of the basal fibres,

so as to explain all varieties of the migraine scotoma ; this region is the inter-peduncular region, and I am going to be bold enough to suggest, what I believe has never been put forward before among all the suggestions hitherto advanced on the pathology of migraine, that the pituitary body is the exciting agent. It is well worth considering. Very slight swelling of the hypophysis would enable it to exert sufficient pressure to irritate the visual fibres in any of the required positions. The cessation of migraine during gestation, when the pituitary body undergoes profound modification, and at the climacteric, and in males at the period when sex powers begin to wane, are very suggestive ; are there any other points in favour of the new suggestion ?

The headache, slow pulse, and vomiting, are the general signs accompanying raised intra-cranial pressure ; swelling of such an intra-cranial structure as the hypophysis, would have this effect, especially if its over activity caused an increased production of fluids by the intraventricular choroid plexuses. It is, however, also known that reduction in the rate of heart beat follows the injection of pituitary extracts in animals. The increased renal activity is very well explained on the pituitary body theory. This gland secretes a hormone which is proved to have a direct effect upon the renal epithelium, so that, in spite of the lowered blood pressure, a great increase in the amount of urine secreted results when it is experimentally injected into animals. The hormones pass primarily into the stalk of the pituitary body, to join the intra-ventricular fluids. If the hypophysis be over active, and accordingly for the time tumefied and enlarged, an increased supply of the hormones necessary to stimulate the renal activity would presumably result. Such hormones might also stimulate the activity of the intra-ventricular choroid plexuses, and raise the intraventricular pressure.

The familial tendency of migraine, the periodicity of the attacks, their abeyance during pregnancy, their cessation at about fifty years of age in both sexes, would all be in agreement with the pituitary body theory. If the central, bi-temporal or homonymous scotoma became permanently established, there would, I imagine, be little difference of opinion as to the site of the lesion ; surely the indication is not less, but rather more, convincing when the manifestations are periodic and in any given case invariable, although transitory. Differences in effects on the same fibres leave room for argument as to nature of lesions, but not as to their situation. I believe a periodic temporary swelling accompanying functional overactivity of the pituitary body explains migraine better than any other hypothesis. I am treating some migraine subjects by glandular therapy. I have had their sella Turcicas examined by X rays, with negative results, but I should expect no bone changes in these cases.

I suppose we shall not yet attempt to treat migraine by decompression at the sella Turcica, but I believe it would be efficacious.

POSITIONS OF FOCAL LINES OF A SMALL CYLINDRICAL BEAM OF PARALLEL RAYS TRAVERSING THE CENTRE OF A THIN SYMMETRICAL DOUBLE CONVEX LENS

BY

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The following note was written in the form of a letter to Mr. Percy Bardsley, who was engaged at the time in the preparation of a paper on "A New Form of Bi-focal Lens" that appeared in the March Number of this Journal (pp. 97-101). It was not composed with a view to publication.

WHEN a beam of parallel light of small section is incident upon the centre of a convex lens along the direction of its axis, it converges after traversing the lens to a sharp focus, the *focus* of the lens; the focal length of the lens being defined as the distance of the focus from the unit point of the lens for emergent light. When the thickness of the lens is an inappreciable fraction of the focal length, a condition that may generally be assumed in spectacle lenses, the two unit points practically coincide with the centre of the lens, so that the focal length becomes in this case the distance of the focus from this point.

When, however, the direction of the beam, whether it traverses the centre of the lens or whether it does not, is oblique to the axis, the rays are no longer focussed at a point, but in two short lines (focal lines); one of them, the first focal line, being at right angles to the plane determined by the axes of the beam and lens, while the other, the second focal line, lies in this plane. It will appear that both focal lines are nearer the lens than its focus for axial rays, so that the focal length of the lens is reduced and its power increased for oblique vision. Further, the lengths of the focal lines, and consequently deviation from distinct vision, increases with the obliquity. It is the object of the present note to form an estimate of the extent by which oblique vision through the centre of a lens is affected by these facts. A convex lens has been assumed throughout, but parallel results would have been obtained by the assumption of a concave lens of corresponding power.

Let the plane of Fig. 1 represent that of a plane through the