20. Therapeutic fasting allows an uncomplicated typhoid infection to pursue a normally mild course without any mixed infection, by reducing the bacterial content of the intestines. This was applied only to the severe cases.

21. Fasting will enhance the effect of hydrotherapy, and frequently render the use of antipyretic measures unnecessary.

22. Gelatin is a valuable food in that it lessens the nitrogenous waste and prevents hemorrhage.

23. The low mortality in this series of cases was greatly due to the elimination of relapses and complications among the mild or abortive cases by restricted feeding and lessening the dangers in sthenic patients by fasting.

24. In this report forty-five consecutive cases occurred without a death. Of the 144 whites, five, or 3.4 per cent., died, and the low mortality, 4.7 per cent., of all cases was ascribed to the dietetic management, though many of the cases had very inefficient nursing.

MIGRAINE, AN OCCUPATION NEUROSIS.*

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It is not claimed that this paper will present a complete explanation of migraine; it is hoped, however, that it will start a suggestive line of thought bearing on a pathogeny which can be at the best only hypothetical.

The form of migraine to which I shall confine myself is the every-day type, the variety which I have found occurring in complete form in 17 per cent. of healthy young adults, and in incomplete form in many more. It reaches its greatest intensity in early life and generally disappears after middle life. It is often preceded by scotomata, by temporary aphasia and numbness, loss of memory, signs of mental incapacity and confusion, and even possibly, as Gowers suggests, by the peculiar feeling that the present is a reproduction of the past, the feeling thus described by Coleridge:

Of t' o'er my brain does that strong fancy roll
Which makes the present (while the flash doth last)
Seem a mere semblance of some unknown past,
Mixed with such feelings as perplex the soul
Self questioned in her sleep.

Any of these symptoms may appear without the pain in the head. Loss of consciousness never occurs, a fact which sharply distinguishes migraine from epilepsy, though there have been attempts to make them analogous. The frontal and temporal regions are most often involved, the occipital next often, the vertex practically never alone.

At the time of greatest intensity the pain is sometimes accompanied by nausea and vomiting, especially in early life, whence the term "sick headache." The time varies in duration from several hours to a day or more. It does not often materially interfere with sleep, though it frequently appears on awakening in the morning. It does not necessarily accompany extreme use of the eyes, though it is apt to appear after such use, as on the morning following a theater party.

The so-called ophthalmoplegic form of migraine is so rare in comparison with this form, and so distinct in its

symptoms, that it seems hardly fair to discuss both types together. The suggestion of Plavec,¹ that the ordinary form is the precursor of the ophthalmoplegic form, seems to have little basis, and his proposed pathology (periodic swelling of the hypophysis) as concerns the ordinary migraine, is purely speculative.

A case reported some years ago by Dr. Cheney and myself has a practical bearing on this question. A man of middle age had suffered many years from what was supposed to be the common type of migraine, though it was accompanied by the unusual symptom of persistent homonymous hemianopsia. The headaches became more severe, various paralyses appeared, mental deterioration ensued, and death followed. The autopsy revealed pituitary tumor.

While this case bears favorably on Plavec's location for ophthalmoplegic migraine, it is far from aiding us in the pathogeny of ordinary migraine. Nor does it suggest that ordinary migraine was the precursor of the more serious trouble. The migrainous headaches in this case should rather be regarded as symptomatic of the local lesion, no more allied to or resulting from ordinary migraine than epileptoid seizures from cerebral tumor are allied to, or result from, idiopathic epilepsy, though they may be mistaken for it at the outset.

Whatever theory is advanced for the pathogeny of ordinary migraine, the use of the eyes can hardly be left out.² The arguments connecting the use of the eyes and migraine are easily preponderant. In the first place too many cases of migraine have been relieved, in part or entirely, by correction of refractive error, particularly of astigmatism, to be explained by coincidence. In the second place, attacks have been frequently aborted by the mere straightening of glasses, as I have many times verified in my own case. In the third place, migraine has lessened and disappeared in innumerable cases after accommodative paralysis has appeared. Finally, study of the blind shows that the greater the blindness the less the migraine. My own examination of a long series convinced me that migrainous headaches are only half as frequent among the blind as among individuals of corresponding age and under like conditions.³

It may be objected that migrainous headaches are not quite unknown among the blind. But it must be remembered that it is a common practice for the blind, as for others, to adjust their accommodation to the distance of their work as judged, even in the absence of sight, by the position of the hands.

Assuming, then, that disturbance of the accommodative centers plays a part in migraine, it need not be expected that the blind shall be quite exempt.

Another peculiarity of eyestrain which has an important bearing on my proposition is the almost continuous frown of the astigmatic. This frown involves principally the corrugator supercillii and the anterior part of the occipitofrontalis, which muscles occupy the regions in which the pain most frequently appears.

If one voluntarily contract the brows for fifteen minutes he will experience a disagreeable sensation which suggests migraine in mild form. This leads to the ques-

1. Deutsche Ztschr. f. Nervenheilk., 1907, xxxii.

2. This statement does not apply to the views of those who find in migraine the precursor of vascular disease and cerebral softening. My conception of migraine is widely at variance with theories which include such outcome. When we weigh the isolated cases supporting this proposition against the hordes of cases running an innocuous course, it seems reasonable to assume that these few cases represent either coincidence of migraine and organic disease or symptomatic headaches which resemble migraine.

3. Eye Strain, Its Importance and Its Limitations, Boston Med. and Surg. Jour., June 22, 1905.

*Read in the Joint Meeting of the Section on Nervous and Mental Diseases, and the Section on Ophthalmology of the American Medical Association, at the Fifty-ninth Annual Session, at Chicago, June, 1908.

tion whether we must assume the pain of migraine to be entirely intracranial, a doubt emphasized by the recent observations of Cushing⁴ showing the non-sensitiveness of the dura, the part to which perhaps more than any other the pain of migraine has been credited. It may assist us to recall a somewhat analogous pain which sometimes appears in the back of the neck and "base of the brain" after long-continued eyework in which the head is held firmly in one position. I have been not infrequently consulted for this pain by persons who have undertaken an uncommon line of work, requiring this posture, the commonest illustration being that of the person who has recently undertaken the position of secretary. This pain so often appears after the completion of the day's work, rather than during the work, that its source is apt to be overlooked. The pain is apt first to appear during the night or in the early morning, and is sometimes decidedly paroxysmal. The only relief is found in discontinuance, or lessening the constancy, of the work (unless, happily, the mere correction of refraction serves the turn). This form of headache is surely muscular rather than intracranial; its analogy to migraine is shown by the fact that it is sometimes preceded by twinkling scotoma.

This occipital form of headache offers a fair illustration of acute occupation neurosis.

The proposition I have to submit is the following:

Migraine is an occupation neurosis, and involves (1) the visual centers; (2) the centers of accommodation (centers of divergence and convergence in the frontal region); (3) the intrinsic and extrinsic muscles of the globe, and (4) the muscles outside the orbit which are called into play in the effort required for accurate vision, principally the corrugator supercilii and occipitofrontalis, and also the muscles inserted in the occipital region, which serve to steady the head.

In order that we may approach the question fairly, it is important that we start with a clear idea of the symptomatology of occupation neurosis in general; its exact pathogeny is hardly susceptible of analysis.

This is a subject not generally understood. "Writers' cramp" has called attention to one symptom (cramp) which is really neither the most prominent nor the most common. Even writer's cramp has its "neuralgic" form, and in other occupation neuroses pain is not only by far the most prominent, but often the only symptom, the other symptoms, weakness, paresthesia and cramp, following with varying frequency and in varying degrees.

An occupation neurosis is a condition resulting from overuse of certain parts. The most constant symptom is pain, generally referred to the overused muscles, but sometimes extending to other parts. Among the less constant symptoms are muscular spasm and paresthesia. The symptoms may be constant or paroxysmal, and are not always synchronous with the muscular overuse which causes them, but sometimes follows after an interval. The disturbance involves the muscles and the sensory and motor cerebral centers which constitute the overused mechanism.

The following case illustrates a common form of occupation neurosis involving the arm:

Patient.—A woman, aged 30, suffered from pain in the thumb and first finger extending up the forearm, accompanied at night by a numb prickly feeling. She practiced much on the piano, carried a heavy music roll, and often sewed a whole evening without stopping. In short, there was almost constant use, in one form or another, of the hand. There was moderate

tenderness of the forearm. There was no objective anesthesia or loss of power. The diagnosis of occupation neurosis was made.

Treatment.—No improvement appeared from simple rest, but when a splint was applied and the arm placed in a sling, thus producing absolute rest, improvement soon appeared, and complete recovery followed. She can now use the hand perfectly, but has learned to keep its use within reasonable limits.

The following case presents a connecting link between such cases and migraine:

Patient.—A successful laryngologist from another state had worked for twenty-five years without vacation. He complained of paroxysms of pain in the left side of the neck and behind the ear, sometimes accompanied by tenderness. The pain would come on when his head was placed in the position of operating, become rapidly unbearable if the posture was maintained, and persist after its discontinuance. It would sometimes come on at an interval after operating. Attempts to read sometimes produced the pain. He had astigmatism with correction by a competent oculist. The condition had naturally given rise to much solicitude, and obvious relief of mind followed the diagnosis of "occupation neurosis." The day following the consultation he spent in and about Boston, and for thirty-six hours was entirely free from pain, an experience which he had not had for some time. On the second day he was feeling so much better that he was tempted to return to his work, notwithstanding my advice for a prolonged abstinence from employment. He was desirous of visiting the Massachusetts General Hospital, and I there introduced him to the throat department, in which he was especially interested. Here he spent about an hour, watching operations, and examining throats. On sitting down to lunch afterward a violent paroxysm of pain appeared and lasted for some time. It recurred during the evening on taking up a paper and putting his head in the position of reading. The evening attack lasted several hours, during which the pain was intense and accompanied by tenderness. The only recourse in this case was absolute cessation from work for many months. He is therefore now taking an extended vacation and reports continued improvement.

This case, like many others which have come under my observation, shows that the pain of occupation neurosis may follow the occupation after an interval, just as that of "theater migraine" may first appear on awakening the morning after attending the theater.

The paroxysmal pain illustrated by such cases of occupation neurosis strongly suggests that of migraine. Nor are the minor symptoms of occupation neurosis wanting in migraine. The analogue of the paresthesia is the scotoma, which represents similarly, disturbance of sensory centers. Analogous to the cramp is the ciliary spasm, to say nothing of the facial spasm which sometimes appears in the lids and spreads to other parts, representing perhaps an effort on the part of the overworked centers to close the eye and relieve the tension. I have seen the most long-standing and obstinate cases of this spasm relieved by the correction of refractive error.

The suggestion that migraine is an occupation neurosis does no violence to the opinion of those who regard all migraine as the result of refractive error, and at the same time may prove more acceptable than the reflex theory to those who insist on the hereditary and constitutional basis of migraine. One need only be reminded that all occupation neuroses are more prevalent among the neurotic and the sensitively organized, in whose families appear the varied signs of feeble resistance. It is surely among this class that we look for migraine—but we have not explained migraine by simply conceding its hereditary tendency.

Furthermore, the theory of occupation neurosis would account for cases of migraine in which the patients

4. THE JOURNAL A. M. A., March 14, 1908

have slight error of refraction, but marked psychopathic heredity, and at the same time explain its prevalence among those who have marked error of refraction, since the eyes are here used with an overwhelming handicap, the relief of which may well cause the disappearance of the neurosis.

According to the occupation neurosis theory migraine may even appear without error of refraction, in other words it may result from overuse of the eyes, or, in cases of extreme susceptibility, from moderate use of the eyes, just as writer's cramp may be produced, doubtless, in the absence of a faulty method of writing. The fact is recognized, however, that a faulty method favors writer's cramp, and, similarly, error of refraction is doubtless more potent than any other one factor in the production of migraine.

It is no objection to this theory that some individuals use the eyes continuously without migraine, while others acquire this trouble with comparatively little use of the eyes. The same is true of all occupation neuroses. One individual can practice with immunity on a musical instrument from early morning till late at night; in another individual symptoms of occupation neurosis appear with a few hours' exercise.

It may be objected that no account is taken of the vasomotor phenomena of migraine, a factor on which Eulenberg, long ago based his entire theory of the pathology of the condition. But the vasomotor changes, in my view, at least, are so far from constant that they are not to be taken into consideration in the search for causal factors, but are rather to be reckoned, when present, as among the comparatively unimportant accompaniments. This is the view long held by Gowers.

The vasomotor symptoms are not only secondary rather than primary, but, in fact, they are not always present. All suppositions based on dilatation or contraction of blood vessels as a primary cause of migraine lead to theoretical considerations which obscure rather than clarify our ideas of migraine. And, further, all such theories are based on a fallacy, namely, that contraction and dilatation of blood vessels necessarily cause pain. To confute this proposition we need only remind ourselves of the extreme dilatation of blood vessels in the blush of shame or the turgidity of anger, on the one hand, and on the other hand, with the pallor of fear and faintness. Even the extreme degree of vascular spasm which results from cold produces numbness rather than pain. It is true that after exposure to cold with resulting vascular spasm, if warmth is too quickly applied, a vascular dilatation follows which is accompanied by extreme pain, but when we consider the extreme degree of vascular dilatation that produces no pain, it is questionable whether the pain is to be attributed simply to dilatation.

The vomiting is difficult of explanation by the theory offered, but it is not less difficult by any other theory. In point of fact, this symptom is probably not one of the essential features but rather an indirect result appearing generally only in the young and at the height of the paroxysm, representing rather a protective effort on the part of Nature, through producing general and special relaxation, just as fainting may appear at the height of pain, resulting from whatever cause. The fact that relief does often follow the vomiting fortifies this supposition.

CONCLUSION.

Migraine is an occupation neurosis resulting, in individuals of neurotic inheritance, from overuse, or use

under the handicap of refractive error, of the parts concerned in vision.

It involves, like other occupation neuroses, disturbance of (1) sensory cerebral centers (those of vision in the occipital region); (2) motor cerebral centers (centers of divergence and convergence in the frontal lobe); and, (3) certain muscles (particularly the intrinsic and extrinsic muscles of the globe, the corrugator supercilii and the occipitofrontalis, and also the muscles which steady the head).

The pain of migraine is not necessarily intracranial, but is localized, in part at least, in the region of the muscles concerned, directly or indirectly, in vision.

DISCUSSION.

DR. H. GRADLE, Chicago: In one-fifth of my records of migraine (headache of periodic occurrence), an ocular origin could be excluded at the start. Of one hundred patients observed by me (consecutive but not selected cases), twenty-two were practically, under ordinary circumstances, relieved of their migraine by glasses as long as they wore them continuously. A few complained again whenever the glasses were omitted. Of these 22 patients, twelve had complained of their eyes, while ten had either not known that their eyes were at fault or had been annoyed only to a trifling extent. Among the cured two had hyperopia, five had astigmatism against the rule or with an oblique axis amounting to 0.37 D. or more, and fifteen astigmatism with the rule (0.5 D. in two instances and > 0.5 D. in thirteen cases). An impression that I had gradually formed of the greater significance of astigmatism against the rule or with oblique axis is not fully borne out numerically by an analytic review of these records, but it is again strongly suggested by noting throughout my case books the more frequent coincidence of migraine with lower degrees of astigmatism (0.37 to 0.5 D.) when the meridian of greater curvature was not vertical. It has also seemed significant to me that one-sided migraine occurred strikingly often on the side of astigmatism with oblique or inverse axis in asymmetric cases (three in this series). Cases of migraine exclusively or mainly one-sided are especially instructive when the attacks occur on the side of the astigmatic eye and are permanently avoided by suitable correction (eight times in these twenty-two). It is significant that hyperopia of unequal degree in the two eyes does not provoke one-sided migraine. In fact, simple hyperopia figures only in a small proportion of the fully relieved (as well as the much benefited) cases.

Of the hundred patients, thirty-two were only partially relieved of their periodic headache. The headaches were less frequent or less severe and shorter. A few of these returned after years with the history of a long partial relief, but with recent increase in the attacks, though with optic change.

Twenty-six received glasses that proved useful as far as the eyes were concerned, but which did not influence the migraine. To these twenty-six I ought to add one-quarter (five) of the remaining twenty, who had previously been given correct glasses by others without benefiting the migraine.

The results are:

- 22 practically cured by glasses.
- 22 benefited by glasses.
- 31 not influenced by glasses.
- 15 not requiring glasses (except simple concave spheres).

Among those merely improved or not influenced as regards the migraine were a number who had besides the typical periodic attacks other forms of headache which were practically cured by their glasses.

An analysis of the imperfect results and failures showed an absence among them of one-sided migraine corresponding to the more astigmatic eye. Yet among the patients least improved there were a few pronounced instances of hyperopia and astigmatism of 1.5 to 2.5 diopters. There was also a scarcity of astigmatism against the rule (or oblique) in the negative series. In those least influenced by glasses there was oftener the history of attacks with fairly regular periodicity dating back to childhood than in the more benefited class of patients. The proportion of simple hyperopia was least

among those entirely cured and greater in those only partially influenced.

I believe that there are various factors involved in the etiology of migraine. Heredity is one of the most constant, but not an invariable one. Anemia, poor nutrition, want of outdoor exercise and indoor confinement have in many instances coincided with pronounced aggravation. In relatively infrequent instances migraine may depend on suppuration of a nasal sinus or the existence of a nasal stenosis. In nearly one-half of my observations there has been no relation between migraine and the eyes. In fact, I have even found the neurosis fairly common among people who do not do much close eye-work. Yet in about one-third the correction of hyperopia and astigmatism made the patient less liable to migraine or reduced its severity. In fully one-fifth of my cases the headache could be practically prevented by the use of suitable glasses, when worn continuously.

The scintillating scotoma is the symptom which more than any other suggests an ocular origin of migraine—at least to the patient. The scotoma does not, however, prove the ocular origin of the migraine, as in thirty-five instances tabulated from my records I find twenty not requiring or not improved by glasses, while nine were benefited and six were cured by spectacles. In two of the cured and three of the benefited only hyperopia and not astigmatism needed correction; in several others compound hyperopic astigmatism was found.

DR. LUCIEN HOWE, Buffalo: We began by using this term "migraine" in a most indefinite sense, meaning either one of two entirely distinct diseases, and we are now just beginning to recognize a difference between them. We still talk about "headaches," but that term may mean almost anything. Head called attention some time ago to the necessity, when we speak of headaches, of stating just where that ache is, what is its area, and also what is the area of increased or decreased sensibility. As long as we talk in a general way about headaches, we are simply increasing the chaos which exists. Again, when we speak of the strictly ocular symptoms, we may mean either the condition of the refraction or the condition of the intraocular or of the extraocular muscles, or of both. That abnormality may be primarily in either or both of these groups of muscles, or may be shown in them only secondarily in the effort to overcome any ametropia which may be present. Now, in any given case, if we do not know what those factors are, we are discussing something indefinite, and increasing the confusion of our ideas. Headaches, especially when localized in the muscles in the frontal region or at the back of the head, are apparently due to the action of the accessory muscles of accommodation. When we contract the frontal portion of the occipitofrontalis we draw also on the occipital portion. That strain can often be relieved, as we know, by proper glasses or by cycloplegics.

DR. HUGH T. PATRICK, Chicago: The use of the eyes is not an occupation at all; it is a function. The idea of occupation implies something acquired for a definite purpose. Occupation is connected with the artificial conditions of modern living, or, if you like, with the present state of evolution or development of humankind. To put an occupation side by side with a thing as remotely, as anciently physiologic, as the use of the eyes, is, I believe, altogether a strained comparison. According to my understanding of Dr. Walton's abstract, there might be ascertainable eyestrain and there might not be; but the idea was that the migraine might have been produced merely by the use of the eyes in a susceptible individual. I believe that this is an untenable position, because the use of the eyes is a function just as much as mastication, digestion and defecation, and we do not call those occupations at all. Of course, one may abuse his masticator apparatus or his digestive apparatus, and he may abuse his bowels, and if he does, he pays the penalty; but to say that a man has an occupation neurosis simply because he exercises, as he is bound to exercise, these functions born away back low down in the primordial something which was originally the progenitor of man, is rather far-fetched.

DR. ALBERT E. STERNE, Indianapolis: We must all recognize the fact that no organs of the body are so constantly in function as are our eyes; that considering the innervation of the

eye, it is hardly wonderful that irritating effects should expand themselves on the central nervous system, notably the brain, through the medium of the eye. I should, however, like to register a strong objection to considering migraine as an occupation neurosis, not only on the grounds that Dr. Patrick has brought forth, but also on the ground that there is in all probability a very subtle but not well-understood relationship between true migraine and epilepsy. It is peculiar enough that the subject of migraine and the subject of epilepsy should come into close contact with the oculists so frequently. It is possibly due to the fact that there is much to be said from the ophthalmic standpoint in dealing both with migraine and with epilepsy. Shall we regard epilepsy as an occupation neurosis? Is there any similarity, or is there even a remote connection between migraine and epilepsy? These questions are far from being solved. We have absolutely no knowledge of the pathology of true, essential epilepsy or of the pathology of true migraine. We know from certain facts and experiences that the two seem to run hand in hand frequently enough. I have seen cases of true migraine, periodic migraine, cease, and in their place I have seen epileptic seizures for a series of years—major seizures at that, not minor—and I have seen these epileptic and epileptiform seizures cease and the migraine become re-established. Such conditions are not extremely frequent, but still they occur in sufficient numbers to warrant us in regarding them as possibly allied, though I do not think that they are anything like identical. They may, however, be founded on similar causes in any given case. On the other hand, they may arise coincidently and independently.

DR. D. I. WOLFSTEIN, Cincinnati: The supposed effect of the constant contraction of the occipitofrontalis muscle in case of headache in connection with occupation neurosis would not appeal to me, as in many cases of headache the patients voluntarily and frequently contract this muscle with a view to getting relief from the headache, I do not doubt that in epileptics or those who have an epileptic diathesis or tendency, occasionally a migrainoid attack may stand in the relation of epileptic equivalent, but I do not believe that migraine and epilepsy are interchangeable and closely related conditions. Certainly most of those who suffer from migraine have nothing in their history to lead to the slightest suspicion that they are in any way epileptic. I do not believe that migraine is often an occupation neurosis because it would be difficult to say what particular occupation itself causes migraine in a very large percentage of cases. Indeed, it is more apt to affect people who have no occupation at all. I believe that there is a very decided connection in many cases of migraine and disturbance of digestion and that a fair proportion of cases are best treated when we take into consideration the gouty, arthritic, or autotoxic forms of disturbance. Often if we treat these cases along the lines of improved elimination and alimentation, with the exclusion of those factors which are toxic in character, particularly the digestion of too much meat, good results are obtained. In my judgment you will find that many cases of migraine are intimately connected with a disturbance in the digestive tract and that the factor of occupation is not of particular moment.

Propaganda Against Cancer in Uruguay.—L. Calzada in a communication to the *Revista Med. del Uruguay*, February, 1908, compares the statistics of uterine cancer in various countries, especially in regard to operability. It was only 7 per cent. in his experience with 187 patients; in France the best statistics give only 20 per cent.; in Italy, 5 per cent.; in Holland, 9 per cent. He urges sending out circulars to physicians impressing on them the importance of early discovery of cancer, also circulars to midwives urging them to send to physicians all their patients with gynecologic affections, emphasizing their responsibility if they allow lesions to pass undiscovered. He also urges education of women by lectures and pamphlets in regard to the dangers of neglect of uterine disease, advocating that this propaganda should be initiated and carried on by medical societies or official bodies to avoid opportunity for individual advertising by irresponsible individuals.