simple incision was made for the evacuation of a collection of pus and the removal of a fragment of dead bone. Although a precautionary dose of serum had been given, the operation was followed within eight hours by a violent relapse of the tetanus.

It is probable that the relapse was not due to the shock of the operation, but to the exposure of a fresh absorbent surface, for I have not observed any similar recrudescence of tetanic symptoms following the administration of an anaesthetic for such purposes as lumbar puncture or the dressing of a wound.

In another case the patient had been wounded in the back; six days after the wound an operation was performed for the removal of a missile lying upon the lamina of the first lumbar vertebra. For a few hours before the operation the patient had complained of severe pain in the wounded portion of the back; this was not at the time recognized as due to the onset of tetanus, although subsequent events showed that the pain had probably been due to that cause, for it increased after the operation, and in six hours was accompanied by trismus. Death from rapidly developing tetanus took place within sixteen hours of the operation.

MacConkey² has recently collected several instances of operations upon wounds followed after a short interval by the development of tetanus in patients who had previously shown no signs of the disease. It is probable that these cases illustrate the danger of making breaches in the inflammatory barrier.

That the policy of non-interference with the wound may be followed without detriment to the patient is proved by Case I and Case III above. A fragment of shell in one case and large muscular sloughs in the other were left undisturbed; both patients recovered. In each case the belief was justified that it was safer to trust to the protective power of the inflammatory zone than to risk the exposure of a fresh absorbent surface.

While avoiding injury to the granulation tissue, every effort should be made by gentle means towards the removal of debris and the cleaning of the wound; for this purpose irrigation with hydrogen peroxide, followed by irrigation with the hypochlorite of soda solution, may be employed.

The objections to interfering with the infected surface of the wound do not apply to amputation above the site of injury. In cases of tetanus associated with septic compound fracture the patient is exposed to danger from the sepsis as well as from the tetanus, owing to the impossibility of preventing movements of the fractured bones; I have observed two such cases in which the patient survived the tetanus but ultimately died from septicaemia. In cases of this nature early amputation probably affords the best chance of recovery; this course was followed successfully in a case under my care. Antitetanic serum was injected into the nerve trunks exposed in the stump at the time of operation.

In an account of the German experiences of tetanus, Pribram³ recommends radical excision of the wound. Owing, however, to the extensive nature of the injuries usually associated with tetanus during the present war, complete excision of the wound would almost invariably be quite impracticable; any attempt to perform it would be necessarily incomplete, and would probably do more harm than good. The case-mortality of tetanus amongst the Germans appears to have been very high.⁴

CONCLUSION.

When tetanus has declared itself, operative surgical interference with the infected surface of the wound is dangerous, and should be a matter for grave consideration; it is preferable to imitate nature's methods—namely, to promote the formation of granulation tissue, and simultaneously to reinforce the patient's production of antitoxin by the injection of large doses of antitetanic serum.

REFERENCES.

¹ Bruce, *BRITISH MEDICAL JOURNAL*, October 23rd, 1915. ² MacConkey, *ibid.*, December 11th, 1915. ³ German Experiences of Tetanus, *ibid.*, December 18th, 1915. ⁴ German Surgical Experiences, Kümmell, *ibid.*, July 17th, 1915.

It is reported from Sweden that the actual delivery of the Nobel prize in chemistry for 1914, awarded to Professor Theodore W. Richards of Harvard University, together with the other Nobel prizes for 1914 and 1915, will be postponed until June 1st next. The prize winners are invited to go to Sweden in person to receive their prizes and to give their Nobel lectures.

VISUAL NEUROSES OF MINERS IN THEIR RELATION TO MILITARY SERVICE.

BY

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THE visual defects of miners have been the subject of careful investigation by members of the profession, and miner's nystagmus in particular has received close attention, and the monograph on this subject by Dr. T. Lister Llewellyn, entitled *Miner's Nystagmus, its Causes and Prevention*, may be thought to have said the last word on this peculiar affection. It may, however, be of interest to record some of the cases which have been met with recently among miners coming from the counties of Northumberland, Durham, and Yorkshire, who have found their way into the army. There may also be some advantage in noting the persistence and, in some cases, the aggravation of these defects in men removed far from the scene of their former work and employed entirely above ground. I had not previously had the opportunity of noting cases of this disease, and therefore approached the subject with some freshness. I have purposely abstained from using the term "miner's nystagmus" for reasons which will be stated, but nevertheless the series of cases given are, in my opinion, examples of the affection which usually bears this name.

It is obvious that the cases quoted are too few to be of themselves of great value, but the fact that they are corroborative of cases quoted by Dr. Llewellyn seems to indicate their similarity to the condition which he describes.

1. In the first place, there can be little doubt that the group of associated symptoms which are present in what is usually known as "miner's nystagmus" constitute a distinct "disease."

2. On the other hand, the name seems to be unfortunate, seeing that the nystagmus is at most only one symptom out of a group which may be absent even when the "disease" is present in a marked form.

3. The symptoms noted in the series of cases given below correspond very closely with those described on pp. 1 and 2 of Dr. Llewellyn's monograph, and it may be convenient to refer to these seriatim, taking them in the order of apparent importance.

(a) Defect of Vision.

This is variable in different cases, and probably is due to a variety of causes, but it has usually been the chief reason which has led to the man in question being sent for examination. There is usually some error of refraction present, but this is insufficient to account for the defective vision, and it will be seen that some of the cases were hypermetropic, some myopic, and some astigmatic in different degrees. In no case was any abnormality of the fundus detected to which any of the disturbance of vision could be attributed, but it was not possible to make an ophthalmoscopic examination in the cases where there was marked photophobia.

(b) Temporary Giddiness.

Next to the visual disability, the occurrence of more or less pronounced attacks of giddiness was a reason for the cases coming under observation. In two instances men complained that they found it dangerous to be on horse-back, and one man came into hospital suffering from bruises because he had fallen from his horse and been dragged along by it. Case 1, which was much the worst of the series, used to have attacks of giddiness, in which he would often have fallen if he had not been held up by attendants in hospital. Others would simply complain of feeling "dizzy," often in the early morning; in no instance could it be proved that there was any absolute loss of consciousness.

(c) Photophobia.

Intolerance of light was present in some measure in practically every case, and this symptom may be responsible for the blinking of the eyelid in some cases, the drooping of the lids in others, and the difficulty which was generally experienced in looking upwards. Judging from the occurrence of this symptom in other forms of disease

affecting the eye, it seems most likely that it is due in this instance to some irritability of the retina, for it is suggestive of the photophobia met with in albinos, or in cases where the pupils are widely dilated in a bright light. There was never any corneal trouble present, and only in two cases marked conjunctivitis, but this was not sufficient to explain the photophobia.

(d) *Headache.*

In most cases there was a complaint of very frequent pain, chiefly in the temples, either at night or in the early morning. Most of them associated this with injuries to the head which they had received in the pit. While there may be some ground for this, the occurrence of the headache, together with other symptoms, was suggestive of that form of headache often met with in cases of functional nerve disorders.

(e) *Perverted Visual Impressions.*

Under this heading may be mentioned the very general complaint of various apparent movements of lights, referred to by some as "dancing lights," "glittering lights," "dazzling lights," and so forth. It seems that these subjective impressions have been directly associated by most observers with the occurrence of the special form of oscillation of the eyeballs which constitutes the nystagmus. It is very doubtful whether this is so. In other forms of nystagmus there does not seem to be any occurrence of similar visual impressions, and the disorder is probably due to other causes. However this may be, the fact remains that the meeting of lights shining out of darkness, whether they are lamps in a pit or gas lamps on a dark road, seems to set up peculiar disturbances of vision which greatly distress the patient and interfere with many occupations. The symptom which has been referred to as "night blindness" is hardly a true "night blindness," but darkness seems to accentuate most of the symptoms, and it is a strange anomaly that "fear of the light" and "fear of the dark" should be present in the same cases, but so it is.

(f) *The Mental Factor.*

No one can have watched a number of these cases without recognizing the very great importance of the mental factor. In spite of the fact that the cases were not spoken of in the patients' hearing as "miner's nystagmus," and that no diagnosis was put upon their diet sheets, yet all seemed to be introspective and oppressed by their condition. In most cases detention in hospital seemed to have a depressing rather than a helpful influence, and the graver cases tended to grow worse in spite of change of treatment. Bromides, stomaclitics, tonics were tried in succession, but all without benefit. Probably the different cases reacted unfavourably upon one another, and yet it was difficult to keep them apart.

(g) *Nystagmus.*

In those cases which have for months been working above ground this symptom was either not present or was at least very difficult to detect. There is no suggestion that the symptom is not as prominent as has been described in recent cases, but it is significant that in the circumstances in which these men were living the symptom seemed to have disappeared. Some may on this ground question the diagnosis, but it is not likely that any one who has read Llewellyn's book will be inclined to do so.

4. The question now arises as to the effect of military service upon this affection. There seems to be no room for doubt that it is a serious mistake for men who have any tendency to the complaint to be subjected to the arduous strain of military service, which not only involves exertion of all the powers of body and mind, but particularly of the eyesight, and it may be worth while to bear this in mind in examining recruits for the army from the mining community.

5. There is, however, another question of even greater importance, and that is the relation of the disease to military efficiency. From the insidious character of the symptoms serious results may follow from the inclusion in the army of men who may become quickly incapacitated. When it is realized that the vision may without obvious cause be seriously impaired, that vision at night time may be reduced to a minimum, and that attacks of giddiness

may come on at any time, it will be believed that the presence of such a man might prove to be a source of serious danger to his unit if any dependence was placed upon him.

6. In conclusion, it will be seen that no attempt has been made to throw light on the causation of the disease, as this has been very fully worked out, and as the cases given were those which were seen apart from the surroundings in which the disability was acquired; but I desire to express very strongly the view that this affection, which is of such vast importance to miners, and which seriously affects the military efficiency of those who suffer from it, needs to be more carefully studied by the neurologist rather than by the ophthalmologist. It is true that the avenue through which the nervous system is deranged is the eye and that vision is disturbed by it, but it seems clear that the "disease" is a general nervous ailment and should be studied as such, and that too great prominence should not be given to the nystagmus, which is only one symptom in the case. If this course were followed it is possible that better results might be obtained by treatment, which, it will be admitted, is very unsatisfactory in the severe cases. Only one comment may be made here under this head, and that is the possible benefit of suggestion, particularly in view of the great importance of the mental factor.

In the following list of cases it is only possible to state the age of those who were in-patients, but the others were all men of military age. The result of ophthalmoscopic examination is not given, but this was carried out where possible without any abnormal appearances being detected.

CASE I.

A driver, R.F.A., aged 33, was admitted to hospital on June 11th, 1915, on account of defective sight and staggering gait. The following symptoms have been specially noted during two months in hospital, and have gradually increased in severity. V. = R. $\frac{1}{2}$; L. bare perception of light. He can only get about with great difficulty, chiefly by feeling his way. The staggering is probably mainly due to inability to see clearly, but there is also some stiffness of limbs, and there is a kind of spasm on tapping over the patellar tendon. There is marked photophobia, which makes it exceedingly difficult to examine him. Much blinking of eyelids, irregular movements of eyeballs, and apparent inability to fix upon any point, but no definite nystagmus. He says that the symptoms are worse at night, and that then, especially, things seem to dance before his eyes. He complains of almost constant pains in the temples and the occipital region. He sleeps badly, is much depressed, and has nervous attacks, especially at night, in which he does not seem to lose consciousness, but is much agitated.

Previous History.—He stated that he had worked in a pit since the age of 11, and was always short-sighted. He ascribed his trouble to various accidents: Eight years ago, when he was buried in a mine accident; seven years ago, when he was kicked by a horse, and had an injury to the skull as well as breaking his jaw. The symptoms have been worse for the past three years.

Family History.—His father is said to have been "short-sighted." He has four brothers, three of whom are said to be "short-sighted" and two affected similarly to patient. They all work in mines.

CASE II.

A private in an infantry regiment, aged 34, was admitted to hospital on July 1st, 1915. He had previously been seen as an out-patient, when his vision was $\frac{1}{2}$ in each eye. It is not easy to say how far the defective vision was due to any real inability to see, or whether it was occasioned by the well-marked photophobia which made it difficult for the patient to look at any object for a sufficiently long time. There was some fine oscillation of the eyeballs in a lateral direction when the lids were held open, but no rotatory movement was detected. The drooping of the lids, as in Case I, corresponded with the illustrations given by Dr. Llewellyn as characteristic of this disease. He has some conjunctival congestion, but no staggering gait or severe headaches.

Previous History.—He stated that he started work in the pits at the age of 12, and that at the age of 15 he had a bad fall, hurting his head, and has never been well since. He ascribed his recent failure of sight to an attack of discharge from the eyes, from which he said that his wife and four children had suffered.

Family History.—Father and mother are said to have weak eyes, as also four brothers who are working in the pits.

CASE III.

A gunner in the R.F.A., aged 28, was admitted to hospital on July 9th, as he had fallen from his horse, so he stated, on account of an attack of giddiness. He had twitching of the lids and slight photophobia, but no nystagmus. The symptoms were worse in the evenings, when he suffered from severe pains in the temples. He stated that whenever he got upon a horse objects seemed to be dancing about in front of his eyes. V. = R. $\frac{1}{2}$; L. $\frac{1}{2}$; not improved by glasses.

Previous History.—He had suffered for six years from somewhat similar symptoms.

CASE IV.

A driver in the A.S.C., seen as an out-patient on July 9th, 1915, complained of defective vision, which, however, was due to myopia, as follows: V. = R. $\frac{1}{2}$ c - 3 D. = $\frac{1}{2}$ partly. L. $\frac{1}{2}$ partly c - 2.25 D. = $\frac{1}{2}$ partly. With both eyes $\frac{1}{2}$. At the same time he complained of difficulty as a driver, as he felt unsteady and wished to be transferred to an infantry regiment. There was no sign of nystagmus at time of examination.

Previous History.—He stated that he had always had bad sight, that a few years ago he had suffered from nystagmus, that he was affected by the lights in the pit, and that he found difficulty in staring at lights at the present time. He said that he had been at various times in the army, but had twice been discharged on account of bad sight (probably myopia).

Family History.—Father's sight good; mother's sight weak; eight sisters and one brother have good sight; one brother is said to have suffered in the same way as the patient.

CASE V.

A private in an infantry regiment attended as an out-patient for test of vision on July 14th, 1915. V = R. $\frac{1}{2}$, and L. amblyopic; hypermetropic with some astigmatism; not improved by glasses to any appreciable extent. He complained of pain in the head, and said that he could not bear a strong light.

Previous History.—He stated that he had had weak eyes all his life, that he had had an accident to the head as a child, to which he ascribes the failure of the left eye; that two years ago he had inflammation in both eyes, and that since then he has noticed dancing or flickering lights when working in the mine. He was better after joining the army until he started musketry practice.

CASE VI.

A private in an infantry regiment came up on July 15th, 1915, as an out-patient for examination of eyes.

V. = R. $\frac{1}{2}$ c + 2.5 D. cyl. ax. $\setminus 50^\circ$ = $\frac{1}{2}$ pty.
L. $\frac{1}{2}$ c + 2 D. cyl. ax. | vert. = $\frac{1}{2}$ pty.

Previous History.—He had been troubled with his eyes for twelve months, especially in looking at lights in the pit, and at night when above ground.

CASE VII.

A private in an infantry regiment was seen on July 17th, 1915, on account of failure at musketry practice.

V = R. $\frac{1}{2}$ pty. c - 3 D. cyl. ax. - hor. = $\frac{1}{2}$ c.
L. $\frac{1}{2}$ pty. c + 2 D. cyl. ax. | vert. = $\frac{1}{2}$ c.

There was some slight sign of oscillation of eyeballs, and it was difficult to get him to look upwards.

Previous History.—He stated that he had suffered from miner's nystagmus, which he believed was caused by knocks over the eyes. He complained of the glittering of lights in the dark and of the moving of things before his eyes, especially if reading a paper.

CASE VIII.

A private in an infantry regiment, aged 33, was admitted July 9th, 1915, on account of conjunctivitis.

V. was at first $\frac{1}{2}$ in both, improved in hospital so that on August 18th it was

V. = R. $\frac{1}{2}$ c - 1 D. = $\frac{1}{2}$. L. $\frac{1}{2}$ c - 1 D. = $\frac{1}{2}$.

There was much blinking of eyes and complaint of pains in the temples, and occasional giddiness, causing a fall one evening.

Previous History.—He stated that he had had many knocks on the head, some of which had stunned him. He seems to have had conjunctivitis at the age of 21. For a long time he had been dazzled by lights in the pit, and when he passed a lamp in the street at night time he had to shade his eyes; he said that he often turns dizzy.

CASE IX.

A private in an infantry regiment, seen on July 26th, 1915, said that he had had nystagmus five years previously, when he was off work for six weeks.

V. = R. and L. $\frac{1}{2}$, improved by + glasses with a weak cylinder to $\frac{1}{2}$.

CASE X.

A private in an infantry regiment, seen on August 5th, 1915, stated that he had suffered from miner's nystagmus two years previously, and was obliged to leave the pits. V. = R. $\frac{1}{2}$, not improved by glasses; L., amblyopic. Refraction hypermetropic.

THE fortieth annual report of the Boston Medical Library, presented on January 11th, shows that the war has caused a great falling off in the number of books and journals received. During 1915 seventy-six foreign periodicals had suspended publication, at least for a time, while others had appeared at very infrequent and irregular intervals. The number of volumes added during the year was 3,688, making a total of 89,963 in the library. In 1876, the year after its foundation, it possessed only 4,488 volumes. It is now the fourth in size among the medical libraries of the United States, being exceeded only by the Surgeon-General's Library at Washington, and those of the College of Physicians of Philadelphia and the New York Academy of Medicine.

A METHOD OF TREATMENT FOR CONJUNCTIVITIS.

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THE treatment of conjunctivitis is an important problem for doctors in the region of the firing line. The ordinary treatment is sometimes ineffective and often slow, with the result that many valuable men in excellent general health are rendered incapable of service for considerable periods owing to the state of their eyes. What is wanted is a treatment which will be at once more effective and more rapid, and it is also necessary that it should be capable of ready application to large numbers of men, and under circumstances in which the facilities for applying even the most simple remedies may perhaps not be very great.

Some of the cases of conjunctivitis are traumatic in origin, others are dependent upon and secondary to some other diseased condition, but most of the cases appear to be simple bacterial infections of the conjunctiva, and so should be susceptible to treatment by ordinary recognized antibacterial methods.

Experience has shown that immunization procedures are peculiarly applicable to many eye inflammations. Gonococcal, tuberculous, and sometimes streptococcal infections of the organ often give most excellent results when treated with the corresponding vaccine. But simple uncomplicated conjunctivitis is apparently seldom due to any of these organisms, and its bacteriology is so inconstant that to apply vaccine therapy would hardly be practicable under war conditions. It is, however, safe to say that any conjunctivitis cases in which styes are present as a complication should certainly be treated with staphylococcus vaccine.

The value of an antiseptic would appear to depend largely, if not altogether, upon the histological position of the invading bacterial army. When the bacteria are superficially disposed, an antiseptic is the most obvious agent by which they may be destroyed. In this process the tissues themselves will suffer injury and death, but such cellular losses will be replaced from the practically illimitable resources of the body, while the superficially placed bacteria have no such reserves to draw upon. When, however, bacteria have penetrated more deeply and have established for themselves in the tissue labyrinth bases where no antiseptic can reach, they can keep up a continuous stream of recruits which, in a war of antiseptic attrition, will be as proof against extermination as the cells of the organ they have invaded. In such a case antiseptics are not only useless but probably harmful, for by devitalizing the tissues they hinder the physiological forces from trying to accomplish the bactericidal effect which the antiseptic itself has no hope of accomplishing.

In conjunctivitis the inflammation is placed about as superficially as it is possible for any inflammation to be. It is the condition above all others in which we might expect an efficient antiseptic to produce good results. Now the substances used for the treatment of conjunctivitis are, as a rule, more distinguished for their astringent than for their antiseptic properties. We thought it would be interesting, and probably profitable, to try the effect of a remedy in which the antiseptic prevailed over any other action, and after some deliberation we chose eosol solution as the reagent best suited to carry out the idea, for the following reasons: (1) It is a most powerful antiseptic; (2) it seems strangely non-irritating to the tissues, almost as though it might imitate faintly with regard to bacteria the action of salvarsan with regard to a more developed form of microbe life; (3) it has apparently already given good results in the hands of some reliable workers in the field of general surgery, though, so far as we know, it has not yet been used in infections of the eye.