

Dilatation of the aortic arch usually follows atheromatous disease of the endothelium, and the question arises whether it be possible, by a Roentgen-ray examination, to determine the presence of atheroma while there is as yet no dilatation of the aortic arch. One is bound to admit that atheromatous patches as such are not recognizable either on the fluorescent screen or on a photographic plate, although calcareous patches have occasionally been shown when they happen to have been caught edgeways, but even this is of extremely rare occurrence.

There is one fact, however, which has considerable bearing on this question of atheroma, and that concerns the form of the cardiac and aortic shadows. We have shown that a generally dilated arch is elongated, and throws the heart into a more oblique position than is seen normally. When aortic regurgitation is present the form of the heart is characteristic, the apex being displaced to

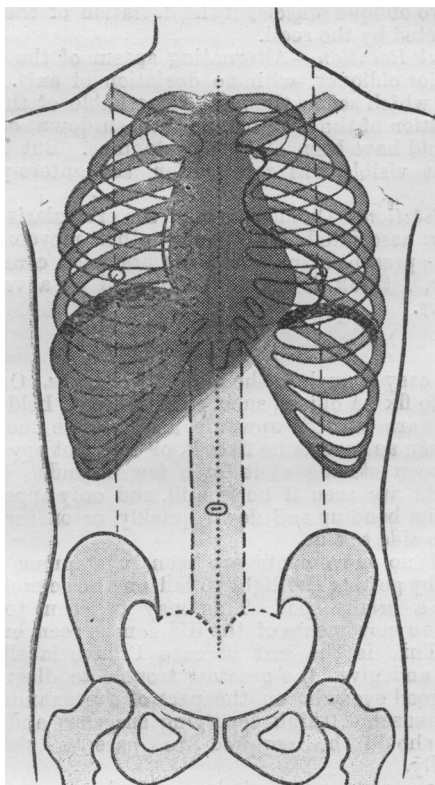


Fig. 6.—Author's diagram showing the normal cardiac area (shaded) and the form of cardiac and aortic shadow commonly associated with aortic regurgitation due to atheroma of the aorta (curved black outline).

the left, while the left ventricle and the left auricle are both comparatively empty. In this way an excavated appearance of the left cardiac border obtains when viewed from the front, and this is accentuated by the prominence of the aortic arch to the left of the spine. Even before the aortic arch has begun to dilate this particular form of cardiac shadow is found, so that in any case in which the presence of an atheromatous aorta is suspected the discovery of this particular form of cardiac shadow affords valuable circumstantial evidence confirming the suspicion of atheroma (Fig. 6).

THE late Dr. Jameson John Macan, brother of the Master of University College, Oxford, left estate of the gross value of £7,628, with net personalty of £7,541.

ACCORDING to the *New York State Journal of Medicine*, the average annual income of the medical profession in the United States is 1,250 dollars (£250).

IT has been arranged that a special congress on the standard of purity in cocoa and chocolate will take place in Paris in January, 1911, when there will be present delegates from Germany, England, Austria Hungary, Belgium, Brazil, Spain, the United States, France, Holland, Italy, Mexico, and Switzerland. The congress is being arranged under the auspices of the White Cross Society of Geneva, whose delegate in the United Kingdom is Mr. Loudon M. Douglas, F.R.S.E., of 3, Lauder Road, Edinburgh.

MINER'S NYSTAGMUS.*

By H. S. ELWORTHY, F.R.C.S.,

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IN compliance with the request of one of your secretaries, who has done me the honour of asking me to read a paper before you, I propose to bring to your notice some observations on miner's nystagmus.

While engaged in examining injured workmen for the Ebbw Vale Company during the past three years a certain number of cases have been examined; but I must ask your indulgence if the observations are not very elaborate, owing to the limited time in which they have to be made, and also if the conclusions I have drawn from them may seem presumptuous or premature, considering the small number of cases and the short period of time in which I have been engaged in the work.

To begin with, miner's nystagmus is a disease peculiar to coal miners. I have made inquiries as to its occurrence in the Cornish tin mines, but have not heard of any cases. Nystagmus is not mentioned in the Blue Book on the Health of Cornish Miners, 1904. Inquiries as to its prevalence in the lead mines of the Isle of Man were also negative. For this information I am indebted to Drs. T. A. Woods of Douglas, and H. Gell of Peel.

ETIOLOGY.

On considering the question, "Why is it that nystagmus only occurs in coal mines?"—I come to the conclusion that it is the absence of colour that makes all the difference.

I take it that the cause is fatigue of the eye, resulting from working by artificial light with a black background and nearly black surroundings. There is the blackish "rubbish" or "slack" above and below the coal, and the jet-black coal with some sparkling facets which reflect the light. The monotony is not relieved by other colours. The miner may come to work with clean face and clothes, but in a few hours all is more or less black from the dust. Then he has to fix with his eye the point at which to strike with his mandril, or to lift out lumps of coal against a black background. When he turns his eyes away from the coal there is no colour relief. To make matters worse, the majority of miners prefer to work in the day. The consequence is that for the greater part of the year it is dark when they get up and go to work; they work in the dark, and in winter it is dark soon after they come out. They therefore get the minimum of daylight, and the opportunity of seeing a variety of colours by daylight, which means physiological relief to the eye.

Another cause of fatigue to the eye is when miners have to walk a mile or more underground to reach the "face" where they work. They proceed more or less in single file, each carrying a lamp which gives out light in every direction. The result is that the miner walking behind another gets the glare of that lamp in his eyes all the time. Consider what that means in a two or four mile walk.

Then, after working his eight hours and his eyes being more or less exhausted, he has to make a similar journey back. On inquiry I have generally found that men feel the effects of nystagmus most when they come from work with the abominable glare of the lamp just in front of them. Many have to sit down and wait until it has gone out of the way.

As to the theory that nystagmus is produced by working while lying down I can give no opinion, as the great majority of the Ebbw Vale colliers, I am told, work in the upright position; and I have not yet seen a case of oblique nystagmus. And, besides, other underground workers get nystagmus, such as hauliers, timbermen, and repairers in coal mines. The only class of workers in coal mines that seem immune is the ostlers, and that is because the stables are whitewashed. That it is not due to imperfect fusion is shown by its occurrence in one-eyed men.

The one essential factor seems to be exhaustion of the eyes from working in the general blackness without any colour relief.

* Read before the Monmouthshire Division of the British Medical Association.

PATHOLOGY.

I know nothing about the minute changes in the retina or nerve centres of the orbital muscles. What seems to me to occur is, when a certain stage of exhaustion is arrived at, co-ordination is lost and spasm sets in; very much the same as in writer's cramp or other trade neuroses. Lastly, accommodation fails. The spasms are clonic, and may be regular or irregular, and confined to two opposing muscles or affecting more. In some cases the whole head is in a state of tremor. In the early or "latent" stage, although there are movements of the eyes, there is sufficient power of accommodation to prevent confusion of vision, but sooner or later this accommodation fails.

SYMPTOMS AND COURSE OF THE DISEASE.

Nystagmus seldom manifests itself until the miner has been working for some years. In the case of boys getting it there may be some refractive error or hereditary element. One boy I examined, aged 15, who got nystagmus after working three years, was the son of a collier who admitted having had trouble with his eyes, but had not been on compensation for it.

The first stage of the disease may be called latent nystagmus. The patient may be perfectly unconscious that he has anything wrong with the eyes, although nystagmic movements may be quite obvious and definite.

One case I examined for an injured back, and who then had nystagmus, worked ten months before being certified for it; another who also injured his back over two years ago has not yet been certified; so that as long as the disease remains in the latent stage, unperceived by the patient, it does not seem to interfere with his work. I do not know how long this may continue, or whether the movements are continual or only periodic.

There is in many cases a general and increasing nervous irritability, and then a blow or sudden fright is sufficient to break down the co-ordination of the ocular muscles, and the power of accommodation to see with moving eyes is lost. The man then discovers that he has nystagmus.

When the disease comes on naturally the first symptoms may be various. In some it is the lamps that seem to move or become blurred, or he becomes dazzled by them; in others headache or pain in the eyes, or else everything becomes misty and he is lost in a fog.

When movements are well developed everything seems moving about, and he becomes giddy and staggers.

Bending down, or sudden movements increase the trouble; so does fright. A man may be able to walk about the street well enough, but, if a dog barks or if some one shouts at him, he is immediately lost in a fog and staggers about, quite unable to see what is coming or where he is going. Hence the danger of such men working in mines.

The most constant symptoms are headache, giddiness, and movements.

My records are far from complete, and I find only 43 per cent. with these three symptoms noted; but my impression is that fully 60 to 70 per cent. have them all. Giddiness and movements, but without headache, also occur, and I find 7 cases with the definite record of no headache, and 6 in which headache is not mentioned. Of these 13 cases, 8 were rotatory, 4 lateral, and 1 mixed.

Intolerance of light and continual headache are frequent, and in severe cases the man can only sit about with his eyes shaded and his back to the light. In such cases there may be an error of refraction as well.

One variety often passes into another, a rotatory to a lateral, or vertical to a rotatory with nictitation. Nictitation often comes on late, and may be the last objective symptom visible, but in some cases it is present early, with very indefinite movements of the eye.

The two eyes may be unequally affected, or have different movements, one lateral the other vertical or rotatory, but I have never seen two eyes rotating in opposite directions.

The greatest discomfort and pain in the head is caused by the very fine and quick movements, and the least by the slower rotatory. An error of refraction may cause persistent headache, and delay recovery unless corrected by proper glasses, which, however, cannot be worn in the pit.

VARIETIES.

I have divided them as follows:

1. *Lateral*.—An alternating clonic spasm of the internal and external recti.
2. *Vertical*.—An alternating clonic spasm of the superior and inferior recti.
3. *Rotatory*.—An alternating lateral and vertical nystagmus in regular sequence producing rotation. In one case with a large and flaccid eye it was quite easy to see the tug of the several rectus muscles at their insertions into the globe.
4. *Mixed*.—An alternating lateral and vertical nystagmus in irregular sequence, producing rotation but irregular movements.
5. *Oblique*.—Presumably a synchronous contraction of a superior with one of the lateral recti alternating with the inferior and the opposite rectus. It could also be produced by the two oblique muscles if the deviation of the axis is not corrected by the recti.
6. *Axial Rotation*.—Alternating spasm of the superior and inferior obliques, with no deviation of axis. I have one case, which seems the most remarkable of the series. Co-ordination of the recti had not broken down, otherwise there would have been oblique nystagmus. But the only movement visible was rotation on the antero-posterior axis.
7. *Nictitation*.—Clonic spasm of the orbicularis muscle. Generally associated with some other movement, but sometimes present alone. As it occurs with considerable frequency, I think it should be classed as a variety of nystagmus.

DIAGNOSIS.

This is easy enough in the majority of cases. On asking the man to fix an object, such as the finger, held so that the eyes are turned upwards a little, the movements may be seen as soon as he fixes it, or may not appear until he has been staring at it for a few seconds. Often no movements are seen if he is still, and only appear after making him bend up and down quickly, or on turning his head from side to side.

Still, if no movements are seen, nystagmus may be revealed by getting the light to fall on the sclerotic, so as to make a bright spot. This may be seen to quiver, although no movements of the iris can be seen, even with a lens. This is the sort of case I have labelled "indefinite," and gives the greatest trouble to diagnose. It requires good eyesight on the part of the examiner, and for this reason I think certifying surgeons and medical referees should be required to pass a sight test periodically.

In some cases movements can only be seen when the man is bending down.

In cold weather, washing the face with cold water and rubbing vigorously with a towel will demonstrate nystagmus, or putting the man in a dark room and suddenly lighting a match.

If all tests fail, one should suspect some other cause, such as an error of refraction, particularly astigmatism. When headache and blurred lights are complained of, glaucoma is to be excluded; and, lastly, there are other causes of nystagmus than coal-mining, and the diseases of the nervous system must be considered and excluded before certifying the case as miner's nystagmus.

I had one case of the indefinite class, who received compensation for a considerable time, and who was admitted to a hospital for some intracranial disease from which he eventually died. No nystagmus was observed while he was in hospital, but he had optic neuritis. This man was certified on subjective symptoms only. It is all very well to certify cases on subjective symptoms just because a man happens to be a collier, but it is very difficult to disprove a claim for compensation if there are these indefinite symptoms, which may, after all, have nothing to do with miner's nystagmus.

ANALYSIS OF 100 CASES.

These are taken just as I noticed they had nystagmus, and without regard to whether they had been certified or not.

Seven were relapses, and counted as fresh cases. One man had one eye, and one had one good and one useless eye, while two had bad squints.

- There were 18 latent cases. Of these—
 8 first noticed nystagmus after a blow on the head.
 1 had it after a blow on the head, but was not aware of it. It is 16 months ago, and he has not been certified yet.
 5 after blows on the eye or eyebrow.
 2 after blows on the back; neither was aware of it.
 1 after a blow on the leg. He developed nystagmus 6 weeks afterwards, while he was still above ground.
 1 after a sprain of his side.

The average age at the commencement of the disease was 35½ years.

The average number of years men had been working underground was 21½ years.

The average period between first noticing eyes and leaving work was 8 months, but this includes 3 cases who noticed them from 2 to 8 years before. If these are excluded, the average period is 6½ months.

The average period of disability for all cases is 5 months, but, as I have included latent and uncertified cases, this is, if anything, an under-estimate. A number resumed work on the surface before complete recovery.

The longest period was 28 months, and he has not yet recovered. The shortest was three weeks. Four cases of over 12 months' duration have not recovered yet.

VARIETIES MET WITH.

As there is seldom a hard-and-fast line to be drawn between them, these are classified according to the most pronounced movement.

Of 14 cases in which nictitation was a prominent symptom, those with some other movement, such as vertical or lateral, are included in those classes, and those with no definite movement except nictitation in the indefinite. There were: Rotatory, 27 cases; lateral, 25; indefinite, 18; vertical, 12; mixed, 12; not recorded, 5; axial rotation, 1; oblique, 0; total, 100.

PROGNOSIS.

As far as my limited experience goes, those men who remain t work struggling for months against the disease until obliged to give up take the longest to recover, especially if old.

Given a youngish man who has been underground for, say, ten to fifteen years, and who comes out early, say in two or three weeks after first noticing his eyes, he will probably get well in two to four months in summer and somewhat longer in winter. The sooner the man with nystagmus leaves off work the better will be the prognosis; but in the early stages the diagnosis is more difficult, as there may be no definite objective symptoms visible.

I have not been examining long enough to say whether the disease is in some cases incurable.

Some inference as to the duration may be drawn from the variety of nystagmus. The average duration for the 100 cases was five months.

1 case of axial rotation recovered in	...	6 weeks
18 indefinite cases recovered in an average of	...	3 months
27 rotatory cases recovered in	...	4½ "
14 cases associated with nictitation recovered in	...	5 "
25 lateral cases recovered in	...	5½ "
11 vertical cases	...	6 "
12 mixed cases	...	8 "

So it appears that the mixed cases—that is, the cases with the greatest inco-ordination—take the longest to recover.

The rotatory and indefinite take the least.

Of the 4 cases not recovered after twelve months, two were mixed, one vertical, and one lateral. Fewer recover in winter than in summer.

I find that in my cases last year twice as many recovered in the six months April to September as did in the months October to March, and this year the difference is still more striking; for where one man recovered in the first three months, six recovered in the second. In summer they get more daylight and there is more colour about the country.

RELAPSES.

One would expect that as coal mining produces the disease, so resuming work underground would produce relapses. How many of these cases will relapse, or how long it will take, I do not know. I have not had time to see yet. For the seven cases of relapse included in the 100 the average time from resuming work to the relapse was twelve months. Two more have been observed with recurrence, but have not ceased work. One of these is now two years after resuming.

The variety of nystagmus in a relapse is not always the same as in the first attack.

TREATMENT.—PREVENTIVE MEASURES.

In the old days of thirty or forty years ago, it seems the custom was for boys to begin work underground at about the age of 7 or 8. With such immature eyes one would think they would be more likely to get nystagmus than the modern boy who begins at about 13 or 14.

But, with the increasing modern education and higher development of the nervous system generally, there may also be a greater tendency for the nervous mechanism to break down under stress. Time will show, but I expect the more developed boy will run less risk of getting it.

The importance of daylight seems to have been overlooked both by the miner and the employer. I take the view that, as far as nystagmus is concerned, working underground in daytime is a mistake, as the miner in doing so loses his opportunity of refreshing the eye by looking at colours in daylight, and so, in a measure, compensating himself for working by artificial light without colour relief.

To get this relief, the hours of work might be altered somewhat as follows:

Start work at the pit head	...	4 a.m.
Come out	...	12, mid-day.
Allow an hour to get home at	...	1 p.m.
Recreation and see the world till	...	6.30.
Bed	...	6.30 to 2.30 a.m.
Breakfast and get to pit head by	...	4 a.m.

He would thus get some four or five hours of daylight all the year round, which is of far more value to the eye than artificial lights.

To prevent unnecessary fatigue to the eyes removable shades should be provided for the lamps, so that they give out light in front only. These should be used in going in and out. When at the "face," they could be taken off, so the light would not be interfered with. With the shade on the man simply wants to see the ground in front of him and the roof to prevent him knocking his head.

The last and somewhat revolutionary preventive remedy I have to suggest is to introduce some sort of a colour scheme into coal mines, no matter how, and thus, if possible, to bring them into a condition at least as good as lead mines. I have not been down a lead mine, but have seen the ore coming out of one, something about the same colour as coke; but the difference is sufficient to eliminate nystagmus, and that is the important point.

As the essential cause of nystagmus is absence of colour, I take it that the one rational preventive measure is the substitution by artifice of sufficient colour to make good the deficiency.

To do this, I suggest that the roof, the leeward sides of the posts and collars, the cogs and sides of the alleyways be coloured with some light but inexpensive wash—whitewash, or, preferably, green or other varied colours.

The dust in mines travels in the direction of the air current, and so it would probably be useless to wash the windward sides of the timbers, but the other side, being protected from it, would last, at any rate, some hours.

The colouring would have to be done daily, and would cost money; but nystagmus costs money.

Suppose a colliery has on an average 100 men on compensation for nystagmus, it loses £100 a week in cash and more in other expenses, and the loss from the men being idle; and, as a collier generally earns more than £2 a week, the colliers are also losing more than £100; thus there is considerably more than £200 a week being lost

between the two parties. To prevent such a loss both parties might well co-operate.

If a quarter of the sum lost through nystagmus were spent in continually colouring the mine, and was enough to bring its colour relief up to the level of a lead mine, I do not see why nystagmus should not be abolished, and the other three-quarters of the loss wiped out.

We must remember that it takes about twenty years to produce the disease, and that in a lead mine there is not a great deal of colour. Quite possibly it may not be necessary to get as much colour as that.

The net result of such a procedure can only be found out by experiment, and one persisted in for a considerable time.

MEDICAL TREATMENT.

The first thing to do is to remove the cause; that is, stop work underground. Let the patient rest, and in subdued light if he has photophobia.

We have to deal with a state of exhaustion and increased nervous irritability. Therefore at first medical treatment should be sedative; such as the bromides or hyoscyamus.

Later, these should be replaced by stimulant tonics and brighter light as he can tolerate it. To commence with stimulants seems to me like whipping up a tired horse instead of resting it.

Mechanical.—Eye shades, blue or smoked goggles give a good deal of relief in some cases, especially in sunlight and snow, but fail in others. I should like to see other coloured goggles tried, particularly green. One man recently told me that when his eyes are very painful he only gets relief on going into a green wood or field.

Proper glasses should be prescribed to correct errors of refraction.

Electrical.—I have not seen any cases that I am aware of being treated by electricity. In chronic intractable cases there seems a fair field for experiment with various forms of electrical treatment.

Special Departments in Hospitals.—Whether it would be profitable to provide green or other coloured rooms, and take in cases as in-patients and apply other special forms of treatment is uncertain. Very likely some way of cutting the disease short could be discovered; but, personally, I think better value for the money would be gained by the preventive measures I have indicated.

[An apparatus designed to show the visual effects of lateral nystagmus was exhibited.]

ON THE CAUSE OF NEUROPATHIC STATES.

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At the meeting of the Societies of Neurology and Psychiatry in Paris on December 9th, 1909,¹ a remarkable difference of opinion upon the part played by the emotions in the genesis of neuropathic states was found to prevail among the eminent members who took part in the discussion. In initiating the séance M. Déjerine maintained that emotion was the sole cause of neurasthenia; pointed out that prolonged emotion—not necessarily violent—was more often the cause than emotional shock; and insisted that in the development of neuropathic states in the infected, the intoxicated, and the overworked the most active etiological factor was the underlying mental perturbation—the tendency to worry. He thus implied that neurasthenics were endowed with a special nervous organization or temperament, which under deleterious influences was suitable for the development of neuropathic states. This temperament determined the individual's power of self-control in periods of emotional stress; it varied in degree in different individuals, and in the same individual even at different age epochs where the temperament was but feebly present. Neurasthenia, he thought, appeared only after many battles, but self-control survived each encounter with increasing difficulty until the neurasthenic state

was fully developed. Such patients are in large measure accidental neurasthenics. An infinite variety of types unites this acquired form to the true constitutional neurasthenic. The clinical picture of any case of neurasthenia depends entirely upon his temperament, character, reactions, former affectivity, etc.; hence cases vary, but are all identical in the main features of the disease—the lack of self-control in times of emotion.

M. Sollier agreed that the emotions played a fundamental part in the development of neurasthenia, but thought that in neurasthenia there was a special reaction of the nervous system to emotions, which might be constitutional or hereditary, and that the part played by the emotions was only that of the exciting cause.

Directly opposing those views was M. Babinski, who asserting that such conditions are never the result of shock, added weight to his contention by reporting a series of observations which he made among classes of the community who daily witnessed people exposed to emotional stress. He had interrogated among others the *post-mortem* attendants of the large Paris hospitals. Some of those attendants had witnessed as many as 200,000 people identifying in the mortuaries their deceased relatives or friends. These people, he contended, had undoubtedly been exposed to great emotional strain. He elicited from the attendants that never had they witnessed amongst all those visitors any who had exhibited an indubitable hysterical attack. He further instances the immunity of the members of the Aero Club de France from neurasthenic states, and referred to the striking absence of hysteria found by M. Neri after the earthquake at Messina. From these data he concluded that an exaggerated importance had been conferred upon the rôle of the emotions in the production of neurasthenic states. M. Déjerine, in reply, stated that those who were chosen from the sorrowing household to undergo the ordeal of viewing the body were only the strongest and most composed members of the family; the more emotional members remained at home, where they may have had their attack; and further, it was quite possible that even those members who came to view the remains had passed through an attack before leaving their home on their painful mission. They did not, however, come unprepared; they had been tuned up to their ordeal; and as a parallel he instanced the absence of neuropathic states in soldiers during battle, and its presence in prolonged sieges, involving hardships and privations of all kinds. Not only were those mortuary visitors in a measure prepared for their ordeal, but the amount of shock experienced by them would almost certainly vary with the cause of the death, whether it had been sudden and under tragic circumstances, or a not unexpected result of bad health or old age. M. Babinski's statement seemed to M. Déjerine to show that sudden emotional shocks were not so important as long-continued anxiety. So also the inquiries of M. Neri into the effects produced on the inhabitants at Messina after the earthquake, cited by M. Babinski, strengthened M. Déjerine's contention, for as the inhabitants were in a measure forewarned, and as they suffered collectively, not in isolation, there was thus established a resistance which prevented the shock from acting so acutely as it otherwise might have done.

M. Crocq stated that neurasthenia did not essentially demand for its development either an hereditary or a constitutional predisposition, the essential factors in its production being overwork, especially mental, intoxication, and prolonged intense or frequently repeated emotions even of average intensity. To support this statement he cited three cases, one of which, bearing upon the effects of sudden shock, was as follows: An advocate, 55 years of age, whose parents had died of old age, and whose brother and sister were well, was working in his office preparing an interesting "pleading." As he casually and inadvertently looked through the window he saw passing through space his son, who had fallen from the window above. The shock of the accident was such that on the following day the unfortunate parent presented the classical symptoms characteristic of neurasthenia. Neurasthenia, M. Crocq went on to say, frequently aggravates the immediate results of disasters, especially railway accidents.