

blind, I made the following note:—"This patient was totally blind on admission. The condition continued for some little time afterwards. For weeks past her sight has been gradually returning, and she is now able to enumerate correctly the number of clerks and nurses collected round her bed, and to discriminate between the various nurses." Here, then, is a case of complete restoration of eyesight which had been lost for more than four months. The discs as seen in the coloured lithograph (Fig. 11) are atrophied. In one of Mr. Baumgartner's cases sight was restored after a period of five weeks' blindness.

It is difficult to say positively what is the cause of optic neuritis in acute lead poisoning. Occurring without any albumen being present in the urine, it has no resemblance to the albuminuric retinitis met with in the chronic form of plumbism with advanced kidney lesion. It may be a descending neuritis, or it may possibly depend upon a distension of the sheath of the nerve; but in no case has the sheath of the nerve appeared to me distended. In nearly all cases with acute brain symptoms arising in the course of lead poisoning there is increased intracranial pressure. The convolutions are flattened, and this may not be without its influence, although possibly lead itself may have some special effect upon the disc and retina. Leber and Deutschmann have propounded the theory that optic neuritis may be caused by irritating or infective particles carried by means of the sub-arachnoid fluid from the cavity of the brain to the vaginal sheaths surrounding the nerve. This is a likely cause, but as there are many conditions in operation at one and the same time in lead poisoning, it is impossible to fix definitely upon one thing to the exclusion of others. Meningitis, however, I do exclude. Leadsalts, or the consequences of their presence in the system, have a special irritant action upon the retina, optic nerve, and brain, and with this there is well-marked intracranial pressure, which cannot but play an important part in the development of neuro-retinitis. On examining the brain in cases of acute lead poisoning, I have been struck by the dryness, firmness, and pallor present, and the decidedly contracted state of the arteries, that therein may lie an explanation of the causes of optic neuritis. As bearing upon this, the observation of Schreiber<sup>10</sup> is interesting. A patient lay for several days in a state of profound coma, with retracted abdomen, in lead poisoning. On ophthalmoscopic examination the retinal arteries were seen to be extremely narrowed. After inhalation of nitrite of amyl this contraction of the arteries disappeared, as also some of the other symptoms. Each time the nitrite of amyl was inhaled this change in the calibre of the vessels occurred.

Occasionally lead encephalopathy is ushered in by hysteria. When this occurs the medical attendant may be entirely thrown off his guard. I have seen a young woman, a lead worker, who was the subject apparently of ordinary hysterical convulsions, die from acute lead encephalopathy within two days. Mr. Baumgartner, who has medical charge of lead factories in Newcastle, tells me that he has seen this on a few occasions. It was Jaccoud who introduced the comprehensive term of cerebro-spinal saturninism, so as to include the great variety of nervous symptoms met with in lead poisoning. The presence of anaesthesia has rendered the diagnosis of lead poisoning difficult. George Guinon has collected several cases of hysteria occurring in saturnine poisoning. In these there have been the combination of symptoms of organic and functional disease. Hysteria may be the only symptom, therefore, of saturnine poisoning. Charcot has drawn attention to the hysterical nature of a large number of the so-called anaesthesias, even when they occur in the male. It was Debove and Achard, however, who first employed the term toxic hysteria to indicate cases in which the neurosis was developed under the influence of intoxications. To them hysteria was only a symptom of saturnine poisoning. Letulle, admitting the identity of saturnine and ordinary hysteria, maintains that lead only prepares the soil for the development of the neurosis in subjects already predisposed. That predisposition, according to Guinon, is heredity.

Of the mental symptoms produced by lead poisoning, I would mention delirium met with during the course of acute encephalopathy, sometimes so violent as to amount to acute mania, and noticed, too, in the late stage of the disease when the kidneys are affected. This delirium, as Dr. Alexander

Robertson noticed,<sup>11</sup> is not attended by rise of temperature, and is therefore not due to meningitis. In one of my own cases there were the symptoms and delusions of general paralysis and distinct meningitis with subarachnoid effusion was found, *post mortem*, in the neighbourhood of the fissure of Rolando. Dr. Hale White has reported similar cases. I may safely say that saturnine poisoning sends few patients to the asylums. In the Waterford Asylum Report for 1871, Dr. Maccabe<sup>12</sup> recounts a case of monomania and depression arising from lead poisoning in which the symptoms of mental derangement disappeared as the patient recovered from the effects of the poison. The patient was a woman, aged 50, who was a white lead worker. She exhibited the blue line on her gums; the extensors of her wrists were weak. Admitted into the asylum suffering from monomania, her insanity was disregarded, and she was put upon treatment for lead poisoning by iodide of potassium. The blue line began to fade and her hallucinations disappeared. She made a good recovery. In this case it is impossible to say whether any predisposition to insanity or other neurosis existed, but the fact that treatment was successful shows the imperative necessity of attending to the bodily conditions that underlie insanity. Dr. Campbell Clark, in the *Journal of Mental Science*, October, 1883, reports a similar case, but with an alcoholic as well as with a saturnine history, in which partial recovery took place. In one of my own cases there was a striking loss of memory, a circumstance which has also been noticed by Dr. Campbell Clark in one of his cases. My patient, a man aged 25, was admitted after having colic and a few epileptiform convulsions; there was no albumen in the urine; he had a well-marked line on his gums, but there was neither paralysis, anaesthesia, nor hyperaesthesia; his knee-jerks were diminished. Several days after he had recovered from the convulsions he was unable to tell me what his occupation was, nor could he name the factory in which he was employed. On mentioning to him, however, a list of the factories in Newcastle, he was able to fix upon his own. As regards the name of the street he lived in and the part of the town in which the street lay, he was equally unable to express himself. He was quite conscious of this defect in his memory, and always asked for time to consider questions before replying to them. He regained his memory.

## EXPERIMENTS WITH TUBERCULIN ON CATTLE.<sup>1</sup>

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A FEW weeks since I had sent to me for examination a tumour excised by Mr. Douglas, veterinary surgeon, Kilmarnock, from the cervical region of a cow. On section this tumour presented the usual macroscopic appearances of a lymphatic gland in an advanced stage of tuberculosis, and a cover-glass preparation from it showed a large number of tubercle bacilli. Mr. Douglas suggested that the cow would form a suitable subject upon which to test the effect of Koch's fluid, and the animal was accordingly sent by rail to the Veterinary College, where she arrived on February 19th.

The cow was of the Ayrshire breed, rather under-sized, and in poor condition. Pulse (56) and temperature (fluctuating between 100° and 102° F.) were almost normal. The appetite was good. The animal coughed occasionally, but the respiratory movements were not otherwise notably abnormal. In front of the right shoulder there was a large suppurating wound marking the site of the tumour above referred to; at the corresponding point on the left side there was a firm tumour as large as the two fists, and a similar but somewhat smaller enlargement was present in the parotid region on the left side. These tumours had the usual characters of hyperplastic tuberculous lymphatic glands.

*First Experiment.*—On February 21st the cow received 20 milligrammes of Koch's fluid.<sup>2</sup> The injection was made on the chest wall immediately behind the left elbow, the hair

<sup>11</sup> *Journal of Mental Science*, July, 1886.

<sup>12</sup> *Ibid.*, 1872-73, p. 233.

<sup>1</sup> A more detailed report will appear in the *Journal of Comparative Pathology*.

<sup>2</sup> For the lymph used in these experiments I am indebted to Professor Greenfield and Dr. Felkin.

<sup>10</sup> *Deutsches Archiv für klin. Med.*, 1878, p. 99.

having previously been clipped closely, and the skin then washed first with a saturated solution of corrosive sublimate, and afterwards with distilled water. For thirty-six hours after the operation the condition of the animal was noted every two hours. The record of the pulse and temperature (rectal) showed a steady ascent of the temperature during the fourteen hours following the injection of the lymph. The temperature remained high for four hours more; forty-eight hours after the injection it had returned to the normal level. The frequency of the pulse was increased, and the disturbance was maintained even after the temperature had nearly returned to the normal. The heart's action was decidedly irregular, and the pulse was intermittent between the tenth and sixteenth hours after the injection. The cough was notably more frequent during the febrile reaction, and the enlarged glands were distinctly more sensitive to pressure. The general appearance of the cow did not denote any serious disturbance; the appetite appeared good throughout, fæces and urine were passed normally, and the animal ruminated and licked herself as in health. A slight inflammatory tumefaction formed at the seat of injection, and this had not quite disappeared on the third day after the injection.

*Second Experiment.*—On February 23rd, at 9 p.m., the same cow received 40 milligrammes of Koch's fluid. The effect in this case was the same as in the first experiment save that the rise of temperature was somewhat delayed, and the maximum temperature recorded was  $104.8^{\circ}$  as compared with  $105.6^{\circ}$  after the first injection. The cough became more frequent, the enlarged glands more sensitive, but appetite and rumination remained undisturbed. Slight inflammatory swelling followed at the seat of injection.

*Third Experiment.*—On February 25th, at 11 a.m., the same cow received 80 milligrammes of Koch's fluid. The effect in this case was almost identical with that produced in the first experiment. In both cases the maximum temperature was reached about eighteen hours after the injection of the fluid; the frequency of the pulse was decidedly increased, and the heart's action was irregular for some hours. The cough was more frequent, and the enlarged lymphatic glands were very sensitive to pressure. The inflammatory swelling at the seat of inoculation was much greater than in the other two experiments, but, as in these, it gradually subsided without suppuration. This cow is still alive and under observation, and the precise extent of the tuberculous lesions in the viscera is not yet known.

The reaction obtained in this cow after each injection was so decided that I felt very hopeful that Koch's lymph would prove a most valuable aid in the diagnosis of tuberculosis in cattle. Unfortunately the results obtained in another case were decidedly disappointing. This cow, purchased for experiment by my colleague, Professor Walley, received three separate injections of the same sample of Koch's fluid as that used in the first and third experiments with the cow above referred to. The injections were made on February 21st, 23rd, and 25th, the quantity of lymph employed being respectively 10, 40, and 80 milligrammes. The animal was a small Ayrshire, only slightly heavier than the first cow.

There was practically no reaction as regards the temperature. The same may be said of the pulse. After each of the three injections, however, there was a notable increase in the frequency of the cough, and the respirations were more laboured, and occasionally oral. The animal was killed on February 28th, and the *post-mortem* revealed most extensive tuberculous lesions. The lung was the seat of scattered patches of tuberculous catarrhal pneumonia, the bronchial glands were greatly enlarged, and both parietal and visceral pleura and peritoneum were literally covered with *perlsucht* nodules. Not the slightest trace of any reaction in the tuberculous parts could be detected.

Had the experiments with this cow stood alone it might have been urged that the non-reaction was due to the dose of Koch's fluid having been too small. But the experiments with the first cow showed that even 20 milligrammes sufficed to elicit a decided reaction, whereas the second cow received in the third experiment 80 milligrammes. As further evidence that the result was not ascribable to the smallness of the dose, the experiments recently published by Dr. Stricker<sup>3</sup> may be

cited. In these experiments 1 cubic centimetre of a 1 per cent. solution sufficed to determine in four tuberculous cows a rise of temperature amounting in one of the animals to  $105.8^{\circ}$ .

Only a few experiments with Koch's fluid on cattle have yet been published, but in almost all a reaction was obtained in the tuberculous animals, while in no case was there any rise of temperature in the control non-tuberculous animals. In all the experiments yet published the tuberculous animals appear to have been in rather an advanced stage of the disease, but it still remains to be proved whether any discernible reaction will follow the injection of Koch's fluid when the lesions are of small extent.

## NOTE ON SOME FUNCTIONS OF THE CERVICAL SYMPATHETIC IN THE MONKEY.

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IN the BRITISH MEDICAL JOURNAL of March 7th, in the Physiological Section of the SUPPLEMENT, appeared an excellent notice of some "Recent Experiments on the Cervical Sympathetic." In connection with this subject it may prove not without interest to mention some results which (with Mr. J. B. Lawford) I have recently noticed to occur, upon stimulation of the cervical sympathetic, in the monkey. In that animal, if weak induction shocks be thrown into the upper end of the divided sympathetic of one side of the neck (the animal being of course thoroughly under the influence of an anæsthetic), the following effects, on the corresponding side of the head, can be seen to follow:—

- a. The palpebral aperture is slightly enlarged, chiefly by a lifting of the upper lid.
- b. The pupil dilates.
- c. The pinna of the ear is drawn a little backwards, so as to project less from the side of the head.
- d. The pinna, if previously flushed, as often happens during the inhalation of the alcohol-ether-chloroform mixture, becomes blanched.
- e. The skin of the nostril of the corresponding side becomes, in a similar way, slightly blanched.
- f. The hair on the forehead—front half of the scalp, temple, cheek, and of the upper part of the whisker—slowly erects itself, lending to the face an expression of surprise and fright.

The converse of the above effects follow upon section of the nerve, and, in addition there appears a slight flushing of the gum over the superior maxillary bone on the same side as the section. These effects are due to fibres in the nerve, which can be easily traced by the stimulation method back to an exit from the spinal cord *per* the anterior roots of the second thoracic and especially of the third thoracic nerves.

The symptomatology of lesions of the cervical sympathetic in man is not without its points of obscurity. The above observations on an animal type, widely removed from man than are the rabbit and cat, may possibly be possessed of some interest, from a clinical as well as from an experimental standpoint.

A further point suggests itself. Dr. Hale White, after careful microscopical examination of sympathetic ganglia, has been led to conclude that the collateral ganglia (for example, the superior cervical and the semilunar) of the sympathetic system are, in adult man, atrophied and degenerate organs, "like the cœcæx or appendage cœci."<sup>1</sup>

In view of the connection in the monkey between the cervical sympathetic and the hair on the front of the scalp, the question suggests itself: Is the loss of hair from the front of the human scalp, which constitutes so common a form of baldness, a phenomenon attendant, perhaps dependent, on the degeneration of the superior cervical sympathetic ganglion in man, for which Dr. Hale White contends?

<sup>1</sup> *Journal of Physiology*, vol. x.: cf. Hale White, *Journal of Physiology*, vol. viii.

APPLICATION has been made to the Board of Trade for a licence to the British Institute of Preventive Medicine to be registered with limited liability without the addition of the word "Limited."

<sup>3</sup> Stricker's *Archiv f. animalische Nahrungkunde*, No. 4, and *Oester. Monatschrift für Thierheilkunde*, March, 1891.