Insanity from Lead Poisoning. By Drs. Rayner, Robertson, Savage, and Atkins.

I.—By Henry Rayner, M.D.*

Although my attention has been directed for some years past to the consideration of this subject, the number of cases of lead poisoning coming under my observation is inconsiderable, and I put forward the following with the hope of inducing others to place on record their experiences rather than with the idea of formulating definite conclusions.

It is unnecessary to describe the general effects of lead poisoning—the colic, the palsies, the arthralgia and gout, are matters of everyday experience; while the various symptoms, the discoloration of the teeth, the bad taste and breath odour, the yellow tint of skin, the appearance of premature age, the emaciation and the slow pulse of high tension, are equally familiar.

In regard to the special effects on the nervous system, a more lengthy notice may be pardoned, and it is of interest to note that the more direct and obvious of these were recognised by the earliest medical authorities; thus, Dioscorides (in his work on mental aberration) mentions delirium produced by lead; Aretæus speaks of epilepsy following colic, and Paul of Ægina refers to epilepsy and convulsions from lead. Many writers in the Middle Ages also described colics terminating in delirium, but do not appear to have recognized them as being produced by lead.

In our own century these complications have been fully recognized, so that in 1830 Tanquerel was able to describe them under the term: "Lead encephalopathy," as being divisible into four classes. 1, a delirious; 2, a comatose; 3, a convulsive; and 4, a delirious, comatose and convulsive form.

His delirious form assigns a predominance to confusion, incoherence and sensory hallucinations in the mental disorders, and he mentions a light trembling chiefly affecting the arms and face, with a difficulty in using the limbs, an embarrassment of articulation and often amaurosis, which renders the muscular difficulties more pronounced.

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The comatose form he describes as occurring suddenly in the midst of apparently good health.

The convulsive complications occur in various forms, firstly, in partial convulsions, analogous to those produced by electric shocks; secondly, in *general* convulsions of the same character, followed by a general stiffness of the limbs and trunk, the patient being completely unconscious, the eyes being open, fixed, and immovable.

The partial preservation of consciousness, Tanquerel asserts, is the distinctive characteristic of lead epilepsy.

My attention was first attracted to the fact that certain cases of insanity in painters seemed to be very much alike in the characteristics of their mental disorder, and that the number of these in the asylum seemed to be in excess of the relation of this class of artisans to the population at large.

As the result of my investigation into the latter point, I find that of the whole male inhabitants of England and Wales, aged 20 and upwards, at the last census, there was one painter, plumber or glazier in 68·1, and that in the county of Middlesex there was one in 34·6.

Assuming that the relative proportion of this class of artisans to the population has not changed, I should have, on this calculation 21·6 of these in my 750 patients, whereas I have at this date 29, or nearly a third more than the estimated number; and I further find that of the patients who have been admitted under my care whose occupations have been ascertained, these artisans are in the proportion of one to 29·3, instead of one to 34·6, as estimated above.

It is probable, therefore, that painters, plumbers, &c., furnish more than their proportionate quota to the insanity of this country. Is this excess due to exposure to lead or other causes? Now it would appear to me that the occupation of these artisans is pursued under favourable conditions, and that they are not as a class intemperate beyond the average of men similarly placed in life.

The direction of their attention to careful habits of living in preventing the effects of lead poisoning would indeed tend to prevent habits of intemperance, although perhaps the good effect of this is more than counterbalanced by the popular belief that gin is a good remedy for lead poisoning. I do not believe, however, that my statistics would show an excess of intemperate habits in the patients of this class; and, on the other hand, I believe that heredity, the other chief cause of insanity, is in defect amongst them.

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The following case is one of comparatively coarse poisoning, for the notes of which I am indebted to my colleague, Mr. J. P. Richards. It is that of a woman, M. T., admitted in January, 1875, aged 34. She had been working for six months in white lead works, where respirators had to be worn on account of the dust. On her admission she had well marked symptoms of lead poisoning; there was great debility and restlessness; hallucinations of sight and hearing, and a delusion that she had a large bag of money in bed with her. She had double optic neuritis, and there was much muscular tremor.

She is now (Feb., 1880) somewhat imbecile, is nearly blind, has muscular tremor of her hands, neck and face, which at times is so great as almost to resemble paralysis agitans, and she is at such times melancholic. She has entirely lost all sensory hallucinations.

The four following cases appear to be the result of a protracted and minute lead intoxication acting on perfectly healthy nervous organizations, and it is almost obvious that the reason why the nutrition of the brain should suffer in minute toxæmia, rather than any other tissue or organ, is the fact of the enormous proportion of blood which passes through the grey matter of the brain as compared with that which is supplied to any other organs or tissues.

The first case is that of J. S., at 53, principally employed as a writer, of sober habits, of perfectly healthy family history, of good physique, and general development; an excellent workman of good character, and of more than average intelligence. Had never had head injury or any serious trouble. Had always been very careful and cleanly, had never had lead colic, dropped hand or gout, but on admission he had a lead line on the gums, was of sallow complexion and very grey. This patient stated that for twenty years he had heard noises, usually speaking in a pleasant manner, so that he was inclined to be by himself that he might commune with them. It was not until he heard of spiritualism that he found himself to be a spiritualist.

His memory was unimpaired, and his power of attention also; he talked coherently and with considerable shrewdness on most topics.

He manifested no emotional depression, but on the contrary, was cheerful and good tempered. He did not feel persecuted or annoyed by the noises he heard, but rather seemed to imagine that he was gifted with a superior faculty.

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He had never had an attack of maniacal excitement, and was altogether free from the feeling of suspicion and resentment common in cases of alcoholic hallucination.

The next case is of the same character. F. S., aged 30 on admission, a decorative painter, of healthy family, a good workman, of sober habits, and steadily employed until the manifestation of his insanity some months before.

He is now 38, of medium height, well built, and normally developed. Sparely nourished, of sallow complexion, hair greyish, very bald, and with marked wrinkling about his eyes.

He has, both by day and night, hallucinations of sight, hearing and common sensation, at one time he appears to have had hallucinations of taste and smell. At present he sees figures which he describes as wind bags, blown out to look like men, and hears them make remarks on him. He also speaks of being electrified at night. He describes in a confidential manner and with great evidence of self-satisfaction, the way in which he destroys these figures by some power which he possesses. His memory is fairly good, but he rambles somewhat in his account of his hallucinations.

His head and arms are occasionally jerked spasmodically, and this he ascribes to electric shocks. He has no noticeable muscular tremor. He has never had any maniacal attack or even extreme excitement.

Formerly he worked at painting in the asylum, but always after a time would strike work on account of the hallucinations, and the "electric" shocks being "too hot for him." Employed in other ways he has been able to keep steadily at work.

C. M., a painter and grainer, of sober and steady habits, and in constant employment, relatives sane and healthy. Lead poisoning was given as the cause of his insanity.

He has now been insane fifteen years, has hallucinations of sight and hearing, and also states that he has electric shocks; his head, arms, and facial muscles are frequently jerked, as if from a sudden involuntary contraction, but he also twists his head and contorts his face voluntarily. He is very incoherent, his memory and power of attention being defective.

He manifests a great deal of cunning self-satisfaction, and believes himself possessed of exalted powers; he manifests no suspiciousness or resentful feeling.

He formerly worked at painting in the asylum, but since he has been otherwise employed he has gained flesh, has lost

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much of his sallowness of complexion, and is less constantly under the influence of his hallucinations.

As an example of a more advanced form I may quote the case of R. R., 27 years insane. He suffered from lead colic in youth. For many years had sensory hallucinations. He is now weak-minded and incoherent, is cheerful and self-satisfied, and has exalted and over sanguine views concerning himself. He has had for many years marked facial tremor, thickness of speech, tremulous hands and shuffling gait. He was at one time regarded as a general paralytic.

In these cases there is no one distinctive symptom, yet the very gradual development of the mental disorder, the absence of attacks of excitement or mania in the typical cases, the absence of suspiciousness and resentment, the existence of contentment, and slight exaltation, together with the sallow complexion and appearance of age, would probably attract attention, although insufficient by themselves to give foundation for the diagnosis of the cause.

It will be remembered that Dr. Garrod observed that 30 per cent. of his gouty out-patients were workers in lead, all manifesting symptoms of lead poisoning. In the following case, the poison appears to have developed gout in the first instance, and later the gouty and lead poison appears to have united in their action on the nervous system.

T. W., æt. 30, a plumber, of sober and steady habits, having no inherited predisposition to insanity or gout.

He was a tall, well-built, well-developed man, had been in good health until the age of 24, when he began to suffer from gout, and he has never been quite free from it since. He had never had colic or paralysis. Had taken large quantities of purgatives, but had remained at work until three weeks before his reception at Hanwell.

On admission he had a well-marked lead line on the gums, was very elated and joyous, possessed millions of money, and had numerous exalted delusions. There was slight facial inco-ordination, some thickness of articulation, and his writing was irregular. The pupils were equal, regular, rather large, and acted freely.

He was put on iodide of potassium, and soon had an attack of gout, which coincided with a very sudden improvement in his mental condition; he improved very rapidly, and was discharged. I believe, however, that his disease was only in abeyance, and that he would, under unfavourable circumstances, re-develop his malady, and die a general paralytic.

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In the next case, that of J. P., æt. 30, a painter, admitted in 1878, the patient had been of intemperate habits and had suffered from gout, but had no inherited predisposition either to gout or insanity.

On admission his gums were spongy and lead-tinted. He was dejected, hopeless and self-abased; he had sensory hallucinations, those of vision being predominant; he was reported to have had several epileptic fits. He complained of tingling and numbness in the hands and feet. There was diminution of sensibility in the extremities, and he could not stand with his eyes shut.

The hands and facial muscles were tremulous, and his articulation was somewhat thick.

This patient has had several attacks of gout, and has notably improved after each. He has entirely recovered sensation in his hands and feet, but has still slight facial tremor; his speech now presents nothing noticeable. He has entirely lost his sensory hallucinations, is now hopeful and cheerful, and has epileptic attacks only at intervals of increasing duration.

I may remark on this case that his intemperance had apparently been moderate in degree and not of long continuance; certainly not of that extent that one would expect to find had the anæsthesiæ of the extremities been due to the effects of alcohol alone.

In the early stages of his disorder he might well have been mistaken for a general paralytic.

From the foregoing cases, and from the records of Tanquerel and others, it would appear to me that there are three chief modes in which lead-poisoning may produce insanity.

1stly. That of coarse lead-poisoning, producing attacks of acute mania and conditions closely resembling general paralysis, such as Tanquerel describes under the term lead encephalopathy, and of which, as he has described it so fully, I have only given one case.

2ndly. Cases of minute and protracted lead-intoxication, producing slowly-developing sensory hallucinations, noticeable by the absence of the feeling of persecution, and by the persistence of the hallucinations of sight.

3rdly. Cases in which somewhat coarse toxæmia in the first instance develops gout, and then, acting in conjunction with the gouty poison, produces a form of mental disorder closely resembling general paralysis.

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II.—By Alexr. Robertson, M.D.

I have had six cases of chronic lead-poisoning under my care during the last five years, all due to working in a white-lead manufactory in this city. The patients were women, and their ages ranged from 18 to 44 years. All of them had at one time or other during their illness suffered from vomiting, colicky pains, and other general symptoms of the poisonous action of lead, but I shall confine my remarks to the points involved in the questions.

Case I., age 18.—There was maniacal delirium on admission, which lasted four days; after that, patient gradually recovered, but it was about ten days before her mind became quite clear. There had been at least one attack of convulsions before admission. The mental disorder resembled a good deal what is occasionally met with in epilepsy, with less disposition to violence, however, than one often sees in epileptic cases. On examination after she became rational, she was found to be completely amaurotic, this being due to white atrophy of the optic disc and other retinal changes. There were no paralytic symptoms.

Case II., age 30.—Patient was amaurotic on admission, with marked cupping of the discs. She stated that her memory had become defective, and that her mind generally was less clear than in health. There was, however, no mental defect obvious to others. There was also temporary weakness of the upper extremities, particularly of the left forearm, but not amounting to drop-wrist. There was likewise marked hyperæsthesia of the skin of the head.

Case III., age 21.—Before admission she had a convulsive seizure, and had been unconscious, or nearly so, for two days afterwards. She had become nervous and shaky, without distinct paralysis. Mind, she said, was less clear than before her illness; had occasional feelings of "needles and pins" at the points of the fingers. There was partial blindness, with marked neuro-retinitis of both eyes.

Case IV., age 24.—General tremor and marked nervousness of manner, but no paralysis. Mind clear.

Cases V. and VI., ages 28 and 44.—No special nervous symptoms, except a feeling of lassitude and mental depression, with some headache and giddiness; and the younger of the two, during the most acute period of her illness, had been much troubled with optical illusions.

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Remarks.—Though there was general tremor, with nervousness of manner in two of the cases, and a degree of paralysis in another, these symptoms disappeared soon after the poison had been eliminated from the system. In no case could any one at all familiar with general paralysis have mistaken the condition for that disease. Further, though there was a temporary mental enfeeblement in two cases (besides the maniacal one), the state was very unlike the emotional weakness with grandiose delusions, so characteristic of general paralysis in most cases.

With respect to the acute attack of insanity, the mania considered along with the convulsive seizure, the amaurosis, the blue line on the gums, etc., constituted a group of symptoms sufficiently distinctive.

III.—By G. H. SAVAGE, M.D.

Henry W. C., widower, aged 45, admitted to Bethlem Hospital, February, 1879. No insane relations; no previous attack of insanity; of sober, industrious habits; foreman at lead works. He has held this situation for many years, but in consequence of depression in trade he had to take on extra duties, such as sampling and handling the white-lead, which brought him in actual contact with lead for three or four months.

The earliest symptoms were noticed 7 to 14 days before admission. They were sleeplessness, restlessness, tremors, particularly of right hand; these symptoms increased, he became noisy and violent, and was sent to Bethlem under certificates, which stated that he was quite incapable of fixing his mind, and that he was very restless. He said he was misjudged, and injured by his foes. He was easily enraged; he wandered about the house all night.

On admission we noticed indecency in dress, incoherence in language, dirtiness of habits, and loss of memory. He had no exalted ideas, no history of colic; he could hardly hold anything in his right hand. Appetite fair. There was very great tremulousness of lips and tongue, and his speech was rather imperfect. He was very violent and noisy day and night, and on the second day he cut his head open against the wall, and would not submit quietly to have it dressed.

There was a well-marked blue line on his gums.

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His weight was 8 stone 9 lbs. The pulse tracing showed increased tension, but to no great degree.

The wound on the head healed slowly.

About three weeks after admission there was exaltation, so that he talked of forming a choir and leading it himself, as he considered himself a splendid musician.

Next he had a small abscess on the pinna of his right ear.

Within a month from admission he became quiet, the tremulousness passed off, he talked less, was clean in his room, and the cut head went on healing.

Two months from admission he was convalescent. The blue line on the gums disappeared.

He was sent to our convalescent establishment for a fortnight, and then discharged well, after two and a half months' residence in the Hospital.

The only treatment given was abundant, easily digested food, some stimulants and purgatives; and as he began to improve without any special treatment, none was given. The blue line disappeared, and the tremors and other nervous symptoms recovered.

On recovery the patient himself explained that lead was the cause of his trouble.

From the first I considered the case to be due to lead, and intended treating him specially, but as he improved unassisted I thought I would leave well alone.

The rapidity with which he became affected is to be noticed, but I saw a case in Guy's Hospital, under Dr. Moxon, where maniacal symptoms and a blue line followed the use of lead lotion for vaginal discharge without ulceration. This case I hope to get published in the Journal also.

Another point of interest is the similarity in the symptoms to those occurring from drink and those seen early in general paralysis.

I have seen recently in Guy's another case due to lead, in which general paralysis was suspected.

For some years I have recognised the symptoms due to lead, and Dr. Rayner, of Hanwell, five or six years ago, pointed out cases of the kind then under his care, and yet English writers seem to have left the fact either unrecognised or unrecorded.

Where the true pathology is remains to be discovered; but such a careful observer as Dr. Gowers has told me that he has recognised many varieties of nervous symptoms from epilepsy to paralysis due to lead.

It seems that lead, and, perhaps, some other mineral poisons

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have a special influence on the nutrition of the nervous centres, and perhaps, too, on the nerve trunks also.

By a strange coincidence, there is an interesting article on Nervous Diseases after Lead-Poisoning, by Dr. Barton, in the last number of "Allgemeine Zeitschrift für Psychiatrie," xxxvii. Band., 4 Heft., page 9.

I believe Dr. Hammond, of America, has written fully on lead neurosis, but that it is generally neglected in England is shown by the fact that in Dr. Blandford's "Index to the Journal of Mental Science" only one meagre report of one case is given.

IV.—By Ringrose Atkins, M.D.

T. O'Shea, house painter, aged 55 years, admitted into the Waterford District Asylum, March 29, 1880. The patient's family history is obscure. It is stated that he had been always irritable, and of a passionate disposition. He resided with his wife in a seaside village, and some sixteen years since first became affected with the ordinary symptoms of lead poisoning, colic, constipation, muscular weakness, etc. Subsequently to this his "fits of bad temper" became more frequent, and at times he appeared to suffer from periods of depression. Six years ago he had his last and most severe attack of coarse lead-poisoning, and since then his mental condition has become distinctly more disturbed; periods of ungovernable passion and excitement, alternating with periods of depression and gloom; during this time his powers of locomotion have gradually deteriorated, his gait assuming a tottering, unsteady character, and coincidently he became affected with muscular tremor, and broke down entirely in health. Increasing mental weakness and irritation, with occasional outbursts of passion, were the immediate causes of his being sent to the asylum. On admission he presented the appearance of a prematurely aged and broken-down man, being thin, with a worn and haggard expression; his gait was feeble and tottering, due apparently to general nervo-muscular weakness, rather than to any definite lesion of brain or cord producing limb paralysis; his grasp was feeble, and there was a general muscular tremor, especially noticeable in the hands and facial muscles during voluntary motion; when he sat with one leg crossed over the other, the upper limb shook uncontrolledly, and in any position a fine fibrillary twitching was noticeable in the muscles of the calf especially

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in the region of the peronei, which appeared to be intensified by exercise. The patellar tendon reflex was absent, or at least repeated attempts failed to elicit it. There did not seem to be any diminution in the sensibility of the skin, nor disturbance of the organs of special sense. The pupils were of equal size. The articulation was slow, and the voice somewhat monotonous, but this was clearly due to the mental depression, and not to any defect in the speech apparatus, in the brain or medulla. The mental condition was characterized by marked depression and weakness of the intellect, and for some time after admission he had repeated outbursts of melancholic excitement, occasioned by his desire to return home. He always persisted in saying that he was quite well, and anxious to go back to his work. During the periods of excitement, he frequently refused his food, and on several occasions had to be artificially fed. His memory was evidently failing; he could recall but little of the events of his life, and when questioned directly could give but little information; this was, however, due in part, at any rate, to the emotional disturbance which invariably became intensified when he was spoken to or interrogated regarding his habits and life. He never gave expression to any delusions, nor did he appear to labour under hallucinations. Since his admission he has had bromide of potassium in combination with muriate tincture of iron, and under these, and with a largely milk diet, he has improved to some extent, both physically and mentally; he walks more steadily, and with greater strength, the tremor has lessened, he is brighter and less depressed, and takes his food without any reluctance. The history of this case, brief and obscure as it is, indicates that the long-continued absorption of lead, and the repeated attacks resulting from it, produced such a degradation in the nutrition of the nervous system, as to lead to the failure of its physical and mental powers. Whether this was the sole cause of the mental disturbance, or only one of the factors at work, is a question which the meagreness of the information supplied renders it difficult to answer; from the statement that he had been always of an irritable disposition, it is possible that there may have been some latent inherited taint, which the lead-poisoning brought into activity. The symptoms of the case are not particularly characteristic; taken, however, together, the physical and mental conditions approach more nearly to the "paretic" than to either of the other forms of the malady which have been described.

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