REMARKS

ON

LEAD-POISONING IN LEAD-MAKERS:

WITH PARTICULARS SHOWING THE OPERATIONS BY WHICH THE POISON IS INTRODUCED INTO THE SYSTEM, AND THE SYMPTOMATIC DISTURBANCE RESULTING THEREFROM, IN TWENTY-FIVE CASES.

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In consequence of there being in the east end of London several factories in which whitelead is made, many persons suffering from lead-poisoning contracted in these factories apply for treatment at the London Hospital; this institution, therefore, affords many opportunities for studying plumbism.

We have been unable to obtain the number of out-patients who have thus applied; but find that sixty patients with well marked symptoms were admitted into the wards of the hospital during the last two years. Of these, thirty-three were males, and twenty-seven females. Of the males, nineteen were aged from twenty to thirty, eight from thirty to forty, and only seven were over forty. The fact that the largest number attacked were under thirty, would seem to indicate that the men are unable to work for a long period in such factories without suffering, and not a few of them becoming incapacitated. Of the twenty-seven females, three were under twenty years of age, nine from twenty to thirty, eleven from thirty to forty, and only three over forty. From these particulars, it might seem at first sight that the females are able to continue the work longer than the men; but inquiry on this point led us to think that the women do not generally begin the work so early in life, and, therefore, the men attacked are younger, because they are employed at an earlier age. The women employed, judging from their statements to us, seem to resort to this occupation when they have failed in their endeavours to obtain other work.

We were anxious to know the operations by which the poison is introduced, and its effects on the system; and, therefore, obtained from a number of patients (twenty-five) particulars of their work and symptoms. We then learnt that some of them had been employed in what are known as "the stoves", where the carbonate of lead is dried. Others had been engaged picking out of the tanks the pieces of metallic lead, which had escaped the action of the acid; these pieces at the time of removal were lying amongst the newly formed soft carbonate, consequently the pickers' hands were necessarily more or less smeared with the carbonate. Others carried the freshly made whitelead from the tanks to the drying stoves; but it would seem that this part of the work is not so injurious. The persons who attend to the drying at the stoves, and those who carry the dried whitelead from the stoves to the warehouse are most frequently attacked, suffer soonest, and commonly have to discontinue their work. In these stove operations, the whitelead, after drying, is powdery and easily shaken about, and the atmosphere around the workpeople who lift and remove it is consequently more or less charged with its particles. This finely divided substance may, it would seem, enter the body by respiration, or by mouth and swallowing, or become intimately mixed with the clothing, and thereby brought into contact with the skin, especially of the hands and face. The persons who remove this dried powdery lead in trays from the stoves are mostly women; and they carry the trays on their heads; consequently, in lifting them up and carrying them along, they must necessarily shake some of the powder in the atmosphere they are breathing.

One woman who had been thus engaged, said that she was first employed in a lead-factory three years ago. She then worked four weeks, not every day, because she found she was unable, but "on and off only" about three days a week. After the first three or four days, she got "queer pains all over;" and, at the end of a month, was compelled to leave work on account of "drop wrist". About twelve months afterwards, she returned to the same employment, continued at it five weeks, and then was again obliged to leave it because of "drop wrist". A third time, she returned to this occupation of carrying about a month before she came to the hospital, and she said that, after working three weeks "on and off", the last day being in the stove department, she found one morning that she had no use in her wrists; she felt exceedingly weak, and had pain in her limbs. When seen at the hospital, at the time she gave this history, the "drop wrist" was very marked.

Another woman said she was employed as a carrier for about twenty-

four days, and was then obliged by illness to leave her work. She was laid up for three months, and seemed to have had well marked symptoms of lead-poisoning. She returned to the employment; and a second attack came on, for which she applied for relief. We found that she had a very evident lead-line on the gums, and other decided symptoms of plumbism.

A third woman said she first worked in a lead-factory three years ago, but not continuously; she usually "washed the pots". After being thus employed four months, she was attacked with lead-colic. On recovering, she returned to the work; and, after three months, a second attack compelled her to absent herself. She went again to the same employment, and a third attack, for which she applied for treatment, followed. She had the usual well marked symptoms.

A case illustrating the way in which the stove attendants suffer, occurred in a man, aged 26, who had previously been a dock-labourer, and had good health. He said he first worked in a lead-factory four months before he came to the hospital; he was employed in "the stoves". After working one week, he began to vomit frequently, and always felt sick; at the end of two weeks, he had "colicky pains like cramp"; in the fourth week, he had to be carried to a doctor, because he was doubled up with pain in his abdomen, and he was very tremulous and felt weak. He also said that, during the month he was thus employed, he did not work more than four days in each week; his bowels were constipated, and he was advised by his fellow-workmen to take aperient medicine. Diluted sulphuric acid was placed in the works, and all the workpeople could use it if they wished, but he remarked that he never found it of any service to him. Three months elapsed from the time when he left the factory to his admission in the hospital, during which he lost the use of the extensors of the wrist; he had great pain in the abdomen, was troubled with giddiness and extreme weakness, and he became very pale and lost a deal of flesh. In this patient the blue line was well marked.

One more case may be mentioned as showing the injury arising from the lead-picking above alluded to. A woman, aged 40, said that, five weeks before she came to the hospital, she for the first time worked in a lead-factory. During the first and second weeks, she worked full time; in the third week, she worked only one day, and was obliged to leave on account of severe pain all over the abdomen; she felt sick and vomited, and was extremely weak. When seen by us, the blue line on her gums was very distinct, and she complained much of pain in the limbs. She further told us that, according to the custom of the factories, she took aperient medicine once or twice every week whilst at work. She had in her occupation to pick the blue lead out of the tanks, and in doing this she must of necessity move about the powdery white-lead amongst which it was concealed.

On taking an average, founded on the statements of these twenty-five patients, the women, it seems, were attacked after working in a lead-factory about four months, and the men, two years; the period varying according to the individual occupation; and, from what we could learn, the earlier suffering of the women was due to the fact that nearly all of them were employed in the more injurious occupations of carrying and otherwise moving the dry powdery lead. Some men, suffering from lead-poisoning, said that they had been employed for many years, one even twenty-seven years, without suffering greatly; but they had worked amongst the blue, that is, the metallic lead.

We next endeavoured to ascertain the symptomatic phenomena which first revealed the lead-poisoning; and, to our minds, the symptoms were instructive, for we soon learned that poisoning by lead is generally attended by symptoms very similar to what occurs in other forms of poisoning. The patients, almost at the outset, become troubled with pain in the limbs and abdomen especially; and weakness with a feeling of great lassitude was an early and very common symptom; they frequently felt sick and often vomited, and constipation was usually an early trouble, for which they commonly took some aperient medicine, seemingly with relief. Not a few of the patients had an appearance which at once suggested lead-poisoning; the face had a dirty yellow or sallow colour; they were generally a good deal wasted and walked feebly, and more or less bent forwards; some of them were so prostrate that they moved with difficulty, and seemed to avail themselves of any opportunity to sit down. Pain and weakness seemed to be the most common and most distressing symptoms; in some the pain was confined for the most part to the abdomen, and although a few had, at the time they applied for relief, severe paroxysmal pain, so-called "lead-colic", in the majority it was not so urgent, but rather of a dull, wearing, constant, aching character. Together with the abdominal disturbance, the patients usually complained of pains in their limbs, and, in some of them, it was confined to these parts; this was chiefly in the joints in many cases, and in others it seemed to be disseminated through the muscles as well. In one case especially, the pain was

referred to the bone, and so localised seemingly in the tibia, that it was thought by some there might be periostitis; this patient at the same time had "drop wrist" and an exceedingly well-marked blue line on the gums. Some of them complained of pain in the head, and occasionally this symptom was very distressing. We have referred above to the characteristic cachectic appearance that is usually observed in these patients, but this was not well marked in all. One patient in particular had not this colour, but his skin was exceedingly pale, and it was instructive to notice that, after he had been in the hospital two or three weeks, this pallor had much diminished, and his aspect was even then much healthier. Nausea and vomiting were also very frequent symptoms, and several suffered with constipation, but usually the bowels acted regularly under the influence of drachm-doses of sulphate of magnesia. Tremor was a common symptom; this brought forcibly to our minds how closely the condition resembled fever; and with this tremor there was usually a great deal of weakness, and a very agitated manner on movement.

With a view to show the symptoms and their frequency, we append the following summary, in which the particulars of twenty-five cases (fourteen males and eleven females) are given. There was in twenty, pain in limbs, or joints, or "all over"; in twenty, colic, severe, or dull aching pain; in eighteen, vomiting; in seventeen, blue line on gums, very marked; in seventeen, tremor, very great in some; in fifteen, constipation; in fourteen, marked cachexia; in fourteen, great weakness—extreme prostration in some; in eleven, loss of appetite; in eleven, loss of muscular power, or "drop wrist"; in ten, thirst, sometimes excessive; in nine, foul taste in the mouth; in nine, nausea, not necessarily vomiting; in six, headache; in six, wakefulness; in five, wasting; in five, strangury; in four, frequent micturition; in three, delirium; in three, offensive breath (probably more frequent); in three, fainting; in two, giddiness; in two, dimness of sight; in one, loss of voice; in one, swelling of the body.

The treatment adopted in most of the cases was, removal from the source of the poison, confinement to bed to a great extent until the most urgent symptoms had subsided, light food, such as milk, broth, etc., quinine and sulphuric acid in some cases, and in others sulphate of magnesia followed by iodide of potassium. With this treatment, the average duration in hospital was as follows. Of the sixty patients, twenty-nine were discharged "cured", on an average within nineteen days; eighteen were discharged "relieved", within twenty-seven days; ten remained under treatment at the time we took these notes; one contracted fever, and was removed to the Fever Hospital; and two died.

The two who died were both young women, and sisters. One was brought to the out-patients' department; she seemed very ill, confused, and with stupor to such a degree, that she was unable to give any clear statement as to how she had suffered, but she said she had had a great deal of pain in her head, and her sister, who accompanied her, told us she had had fits in which she lost her senses; these were evidently epileptiform. She had for some weeks worked in a lead-factory, but, her health failing, she was obliged to leave it, and the fits came on. It was found she had a well-marked blue line on her gums, but it was recognised at the time that she might be an epileptic, and the seizures and lead-poisoning might coexist without their having any relation of cause and effect; and inquiry showed, that she had, when very much younger, suffered from fits, but, as far as we could gather, she had been free of them for years until she went to work in a lead-factory. This patient's heart, lungs, abdomen, and urine were examined, but there were no signs of chest or abdominal lesion. She was taken into the hospital, and next day she died. The necropsy showed that the viscera were healthy looking; the spinal cord was also examined microscopically, and no morbid change was discovered. A large portion of the brain was analysed, and Dr. Tidy reported that he discovered lead in its substance.

Within a few days of this patient's death, the sister above referred to, who had also worked in a lead factory just previously, was admitted into the hospital, and she, too, rapidly died with epileptiform seizures. The lead-poisoning in these cases would seem to have determined the later fits and death.

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ABSTRACT OF THE LUMLEIAN LECTURES ON LIFE, AND ON VITAL ACTION IN HEALTH AND DISEASE.

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LECTURE III.

ONE of the most remarkable examples of inherited constructive power is the bioplasm of the spermatie particle. The bioplasm of a human spermatozoon, which, perhaps, hardly weighs as much as the one-hundredth part of a single red blood-corpuscle, may stamp with unmistakable individual characteristics several tissues and organs which, in their fully developed state, weigh many pounds. Moreover, the influence of the power thus conveyed extends over many years, and is as distinctly manifest in the action as in the structure of tissues. This influence may not be clearly evident until many years have passed since the minute particle of bioplasm left the organism that produced it. But how are we to explain the association of such far-reaching constructive power with molecules of such minute size? No properties of any elements that have been discovered are in any way comparable with those manifested by this wonderful particle. Mr. Darwin has, therefore, endeavoured to explain the marvellous properties in another way.

It is suggested that living spermatozoon may be composed of particles detached from every component element of the tissues of the parental organism, passing from every part of the body where they were formed, and moving with unerring precision towards the gland-tubes, where they collect together in sets without confusion, thus to form the spermatie particle. By what means these millions of particles find their way to their proper destination—how they are sorted, how at last they arrange themselves in proper order, has not even been suggested. But, further, it is not stated from what part of the cells the particles are supposed to come. Now, the anatomical elements are complex, and many are composed of several kinds of matter. Many are growing, and the matter of which they consist is in very different states in different parts at different periods. If non-living particles were to collect in the manner assumed, it is not conceivable that such a collection could in any way have vital powers communicated to them. On the other hand, if we assume that the minute particles are detached from the bioplasm, we should have to assume that minute particles of bioplasm passed through even the thickest and hardest formed material in a direction the opposite of that in which nutrient fluid was flowing. We must further conceive such living particles as making their way into the intercellular spaces, and directing themselves, or being drawn, into the blood-vessels or lymphatics, or working their way through the tissues in the most direct course towards the seat of their development. By what means they find their way, why they do not take up nutrient material and grow so large as to be stopped in their course, how it is that many are not lost and impacted in growing parts, it is impossible to conjecture.

It has been suggested that a general directing agency might be influential in regulating and governing the phenomena contemporaneously proceeding in all parts of a living body which result in the formation of very different structures, somewhat as a number of workmen are controlled and directed by a central authority placed over them. Certainly, the facts of the case do seem to demand some such postulate; for, as each part grows and undergoes development, changes occur in other parts not anatomically connected with the first, but otherwise related, though separated perhaps by a considerable distance. But there is, in fact, no centre from which such power could act, and there are no means by which it could be conceived to operate upon tissues at a distance. I cannot even admit that any facts known to us justify the belief that one cell is capable of acting upon adjacent cells. I do not believe that any particle of living matter is capable of influencing the phenomena of any other particle, except perhaps by taking up more than its own share of pabulum, in consequence of an unequal distribution.

It will be asked, How, then, are the facts to be explained? If the