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Diseases OF SPECIAL OCCUPATIONS.

No. II.

THE SHEFFIELD FILE-CUTTERS.

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IT is my intention to pursue the same course with the file-cutters as with the Sheffield grinders, and to consider only the disease which arises in consequence of the peculiar occupation of cutting files.

A file goes through several processes before it is completed. It is first forged, then ground, then cut, and, lastly, it is hardened.

My present remarks will be confined to the disease which is the result of cutting files, and which is known as the file-cutters' disease.

Files vary in size and in weight. Some files are only an inch long; others are at the least forty inches.

Excluding from our present consideration the "file-grinders" and "file-hardeners", I find from returns kindly supplied to me by Mr. John Warren, the intelligent secretary of the file trade, that at present about two thousand eight hundred men, women, boys, and girls, are engaged in Sheffield in the manufacture of files; and of these, two thousand are employed in cutting files. Boys frequently commence their trade at nine and ten years of age.

During the process of cutting, the file is placed upon a bed of lead, which rests upon an anvil. The quantity of lead consumed varies with the size of the file. In cutting "rasps", the workman will use about three quarters of a pound of lead in a week; in cutting the large three-square files, more than a pound will be used in the same period. The lead may be collected from the bed on which the files are cut in considerable quantities; it is then in the form of a very fine black powder. The files are cut with a small chisel; and the hammers which are employed will vary in weight from one ounce to eight or nine pounds.

A. NATURE AND SYMPTOMS OF THE FILE-CUTTERS' DISEASE.

The *File-Cutters' Disease*, resulting, as it does, from the absorption of a portion of the lead employed in their trade, demands our most attentive consideration. Colic and paralysis from the poison of lead exhibit a form of disease peculiar in a great degree to the industrious artisans of this and other countries, and, therefore, the whole subject is well worthy the most serious notice of the guardians of the public health.

I think I shall be correct in stating that this disease manifests itself among all who are engaged in the manufacture or use of the compounds of lead; and that it is observed among file-cutters, painters, lead-smelters, shot manufacturers, sheet-lead rollers, sugar-of-lead, red-lead, white-lead, and litharge workers; compositors, plumbers, potters, sealing-wax makers; enamellers of German cards, colour grinders, lead miners, etc. It may also be added, that the other causes of lead poisoning are the use of food or drink impregnated with this metal; and so high an authority as Dr. Letheby has pointed out that the lead pigments so frequently employed for colouring Cayenne pepper, cheese, lozenges, and snuff, are calculated to produce the disease in question. It is certain that lead may be rendered soluble by any of the secretions of the body; and that, consequently, it may be introduced into the system by the lungs, by the alimentary canal, the vagina, the skin, and even by the conjunctiva. Dr. Alderson is of opinion (*Lumleian Lectures*, delivered at the Royal College of Physicians, 1852) "that absorption by the lungs is more productive of deleterious consequences than any other mode of receiving the metal into the system."

The following cases, selected out of a very large number of file-cutters that have been under my care, exhibit many of the well known symptoms of poisoning by lead.

CASE I. W. Jenkinson, aged 26, March 3rd, 1857. He states that he has worked as a file-cutter since the age of 13. His father died at the age of 66, and his mother at the age of 53. He stands five feet two inches; his chest is well formed, and expands freely on taking a deep inspiration. His complexion is of a peculiar yellowish hue. He was tolerably well, with the exception of suffering from indigestion, till two years ago, when he was attacked with violent pain at the umbilicus, and vomiting. His bowels are always more or less constipated; he has cut large files, using a hammer of about five pounds in weight. The gums are spongy, and bleed if touched. The blue line is very well marked, both around the upper and lower teeth; there is also partial "wrist drop" on the left side.

CASE II. McQuinn, aged 15, February 24th, 1857. He states that "he began to cut files when ten years old, and that he has worked at the trade ever since", and now cuts large files; uses a good deal of lead. His complexion is sallow, and the bowels are costive; he has violent "twisting pains in his abdomen, which are rendered more easy if he presses with his hands as hard as he can over the seat of pain." His "hands go numb", so much so, that for some time past, he has hardly been able to hold the chisel. The fingers which rest on the lead first began to feel queer. The blue line is very marked, both on the upper and lower gums.

CASE III. George Langdon, file-cutter, aged 32, was admitted a patient at the Sheffield Public Dispensary under my care, on December 16th, 1854. He stated that he first felt seriously ill about two months previously. He was then suddenly seized with violent pains in his abdomen and cramps, to which succeeded complete paralysis of the right hand. He has the peculiar lead cachexia. The blue line is very strongly marked.

CASE IV. Joseph Kay, aged 53, file-cutter, was admitted at the Sheffield Public Dispensary on April 20th, 1854. He has frequently suffered from violent attacks of lead colic. The lead cachexia is exhibited by this man in a remarkable degree. Both wrists are very feeble, and the blue line visible both in the upper and lower gums.

CASE V. Samuel Wheatley, file-cutter, aged 17, was admitted at the Sheffield Public Dispensary on May 4th, 1854. He has had frequent attacks of severe pain in the abdomen; his fingers have often felt numb; and his wrists are weak. The blue line is marked round several of the teeth in the lower jaw. Six weeks ago he was attacked with epilepsy. He says: "I have had a fit every day; they often attack me in my sleep. I have had as many as three in one night." He walks badly, and articulates very indistinctly.

CASE VI. Thomas Maxfield, aged 36, a file-cutter, was admitted at the Sheffield Public Dispensary on July 27th, 1855, with the usual symptoms of this peculiar disease. He has been for many years dyspeptic, and troubled with constipation, which has been partially relieved by purgatives. He has got worse of late, and has had several violent attacks of colic. He complains of weakness of the left wrist, and numbness of the fingers of the same hand. His sight is somewhat impaired. He has often an aching pain at the lower part of the spine, which radiates into the thighs. The countenance is anxious, and indicative of suffering; and the skin is of a dirty yellowish hue. The blue line is very distinct around several of the teeth, both in the upper and lower jaw.

It would be occupying the space of this JOURNAL to little purpose were I to go on detailing case after case of poisoning by lead in the scores of file-cutters that have been under my care. On examining a great many of those men in the different work-

shops, I have found the blue line in a great many of them, even when they have complained as yet of no indisposition beyond constipated bowels and trifling dyspepsia.

The symptoms present in these men, no doubt, vary a good deal with peculiarity of constitution. One man is seen suffering from colic; another file-cutter complains of curious aches and pains in the legs, arms, along the spine, and in the body; others are the victims of epilepsy, convulsions, paralysis; and, again, a modification of the paralysis is now and then seen in the forms of deafness or of amaurosis. Without entering into the vexed question, that colic is the acute, and paralysis the chronic form of this disease, it may be observed that, in the more partial influences of the poison, there is a disinclination to act; rather would I say, a want of power to act, the result of the pain which is often present; and, as the influence becomes more completely established, the patient is obnoxious to the more severe forms of paralysis.

The earliest symptom of the influence of lead that I have noticed in the Sheffield file-cutters has been the blue line surrounding the edges of the gums, which have a tendency to bleed. To this succeeds habitual constipation, pain after food, loss of energy both of mind and of body, aching of the legs and arms. The cause of these symptoms is often not even guessed at; and, on opening the mouth, and saying to a man who comes to the Dispensary complaining of those symptoms, "You are a file-cutter," the physician is often met by a stare of astonishment that the information afforded by the blue line fringing the edges of the gums has supplied the evidence of the nature of the employment and the cause of the disease, of which the patient till that moment has not had the remotest idea.

These earlier symptoms generally yield to purgatives, warm baths, and a removal for a week or two from the workshop into the country. He then returns to his trade, and, after a time, you see him again with probably a train of symptoms indicative of the chronic effects of lead. The complexion is of a dirty yellow cast; the margins of the gums are stained of a deeper blue. He will generally tell us that he has had many attacks of violent colic; and in colic we have probably the results of the peculiar action of lead in the large intestine, the circular fibres of which have been first contracted and then paralysed by its action; the astringent properties of the lead prevent the muscular fibre from exercising its natural functions; and, consequently, I agree with Dr. Alderson in thinking that the colic is the result of an approach to the specific paralysis of lead, developed in the muscular coat of the intestine.

As the system becomes more and more impregnated with the poison, the symptoms are more aggravated; the patient has a shuffling gait; the arms become weak; there is then often complete *wrist-drop;* the constipation is more difficult to remove; violent colic attacks him; the pain becomes more and more severe; he rolls about the bed in excruciating agony; everything he swallows is immediately vomited; and he vainly seeks, by friction and pressure on the abdomen, to mitigate his sufferings. When, in the more chronic cases, the paralysis becomes complete, and there is an actual change in the structure of the muscles, the prognosis should always be unfavourable rather than favourable; for, when you see a man who has had repeated attacks of disease resulting from the poisonous effects of lead; when you see the lead cachexia exhibited in his countenance; when you mark the impaired muscular power; when you observe that the paralysed muscles are attenuated,—there are abundant evidences that the constitution is broken up and enfeebled to a degree from which recovery must be difficult.

It has been suggested that, when the lead enters the system through the lungs, the result will probably be paralysis of an acute kind; and that, when it gains admission into the body through the alimentary canal, it most frequently produces colic. The intimate communication existing between the nerves of respiration and those of the axillary plexus should not be lost sight of in investigating what may be the manner in which the poison has paralysed the muscles of the forearm.

B. PREVENTION OF THE FILE-CUTTERS' DISEASE.

One of the most simple and at the same time one of the most effectual means for preventing the attacks of poisoning from the employment of lead is the daily use of the bath, so as thoroughly to purify the skin, and to remove from the surface of the body the particles of lead which have been collected during the day. If the file-cutters object to the daily use of the bath, then, on leaving work, the neck, face, hands, arms, and arm-pits, should be well washed with soap and warm water, and the shirt and clothes be changed, keeping one set for the house, and another for the workshop.

It was pointed out by the late Dr. Pereira, that the addition of four ounces of sulphate of potassium to thirty gallons of water much increases the efficiency of the warm bath; the sulphur of the alkaline salt combining with the lead which is present on the skin, or just below its surface, forms a dark discoloration. This is more particularly observed in the axilla, the abdomen, the inside of the thighs, the hands, and on the back. Such facts as these speak loudly in favour of the more general establishment of baths in every large town, for the use of the artisans who may be employed in it. Such public baths in Sheffield, to which our file-cutters could resort, and where they could have baths in which the sulphate of potassium had been mixed, would, I am certain, confer most important benefits on hundreds of these men, prolonging, as it could not fail to do, their lives, by removing in some degree at least the cause of lingering disease, attended as it often is for years by much discomfort and suffering.

The habitual costiveness to which the file-cutters are liable I have found best relieved by attention to diet, by the frequent use of injections, by the warm bath, by doses of sulphate of magnesia in the infusion of roses, and by taking now and then a pill consisting of the compound extract of colocynth and croton oil. Of the use of the iodide of potassium I shall speak in the next section.

C. TREATMENT OF THE FILE-CUTTERS' DISEASE.

I know of scarcely any subject in the whole range of medical science of greater interest, or one more deserving the most serious attention of the profession, than the examination of the chronic effects of lead on the human frame, and of which so remarkable an example is furnished in the file-cutters of Sheffield. In the treatment of this disease, our first efforts are to be directed to the expulsion of the poisonous metal from the system, and happily (since the publication of the memoir of M. Melsens, in which he has shown most clearly, by numerous experiments, that the iodide of potassium is not only a safe, certain, and radical cure for the common forms of saturnine and mercurial poisoning, but an equally sure preventive of the injurious effects so frequently produced by emanations from lead and mercury) we have the means at our command; for I have no hesitation in stating that the iodide of potassium exerts far greater influence over the effects which arise from the poison of lead, and does more to the restoration of the body to a healthy condition than any other remedy, or combination of remedies, with which we are acquainted.

In the treatment of lead poisoning, we shall do well to keep in view the aphorism of M. Melsens, and to consider only two things, "the disease from the presence of the poison in the system, and the cure by the expulsion of this poison out of the system"; and the principle of treatment by the iodide of potassium is to render soluble any metallic compounds which have become fixed in the living body, and to facilitate their elimination by uniting them with a substance most readily cast out of the system. Melsens assumes that in all cases of *mercurial* and *saturnine* poisoning, that the metallic substance is in actual union with the affected part or parts, and that it is retained there in the form of some insoluble compound. He considers that the iodide of potassium, after its absorption into the blood, combines with the metallic poison, and forms with it a new and soluble salt, freeing the poison from its union with the injured part; thus, as it seems, separating it from the damaged fibre, and once more setting it afloat in the circulation. M. Melsens having shown that the compounds formed by the union of mercury and its salts with certain of the tissues can be destroyed, and that the metal, on being dissolved by the iodide of potassium, can be eliminated through the kidneys, as proved by actual chemical evidence of the presence of mercury in the urine, goes on to speculate that the elimination of lead in the same way is rendered highly probable by the solubility of the saturnine salts and compounds in the iodide of potassium; and, by the undoubted prophylactic and curative powers of the iodide of potassium in cases of impending or actual lead poisoning. It remained, however, for Dr. Parkes, in the first instance, and more recently for Dr. Sieveking, to demonstrate that in cases of saturnine paralysis the iodide of potassium does cause the elimination of lead. That it possesses this power, any of the readers of this Journal may satisfy themselves by giving it in the next cases of paralysis from lead that may be under treatment. To demonstrate its effects, the urine must be first evaporated to dryness; the residue should then be boiled with nitro-hydrochloric acid

and filtered. The filtered portion, on the addition either of sulphuretted hydrogen, or of sulphide of ammonium, will give a precipitate of the sulphuret of lead, if this metal be present.

In order to obtain the full advantages of the remedy, I think it most desirable first to give a brisk purgative and a large enema. When the iodide of potassium is administered, it is important that it should be taken fasting, in order to prevent decomposition by acids, and also that it should be given *largely diluted*. I have never given it in such large doses as M. Melsens suggests. Ten grains three times a day is the largest quantity I have yet employed. From the able translation of his memoir, by Dr. W. Budd, it will be seen that M. Melsens is of opinion that there is no evidence to show that sulphuric acid is an antidote to slow lead poisoning, but that sulphate of magnesia may be properly given in cases of poisoning by a soluble salt of lead, to act on the portion yet unabsorbed.

Although our efforts are to be directed to remove, as speedily as possible, the poison from the system, in treating the disease to which the file-cutters are so liable, certain complications will arise, requiring that means should at once be adopted for the relief of urgent sufferings; and it will often happen that in violent attacks of lead colic, opium, in some form or other, is indispensable, either alone or combined with calomel; frictions, with an opiate embrocation and injections of warm water also, are frequently useful in affording temporary relief. Obstinate constipation more generally yields to croton oil than to any other purgative. The warm bath is always of essential service.

In cases of paralysis and "wrist drop", some adequate support must be afforded to the hand and arm, and electricity or galvanism may be applied to the paralysed limbs. I find, however, in actual practice, that in the different phases of the *file-cutter's disease* all other means yield in importance to full doses of the iodide of potassium, administered in the way which I have already pointed out.

The subject of *lead service pipes*, in connection with the supply of water to the houses of all classes of the community, is one of no little interest and importance; and one on which, did my present limits permit, a few remarks might not be out of place. That the day is not far distant when *lead*, as a means for the general distribution of water, will be abandoned, I feel certain. For my own part, being of opinion that it is, as a general rule, highly dangerous to bring water into contact with this metal, I hope that lead pipes will fall into general disuse; for why employ so dangerous a metal in any portion of the transit of water to our houses, when there exist in gutta-percha, porcelain, slate, zinc, and iron, substitutes which combine the advantages of durability and cheapness with perfect freedom from danger? The best means of purifying water from the contamination of lead is by filtering it through sand and animal charcoal.

Surrey House, Sheffield, May 5th, 1857.

Illustrations OF HOSPITAL PRACTICE:

METROPOLITAN AND PROVINCIAL.

HOSPITAL FOR SICK CHILDREN.

CASE OF SPONTANEOUS GANGRENE IN A CHILD.

Under the care of W. JENNER, M.D.

[*From Notes by* DR. HARRIS, *House-Surgeon.*]

WE are indebted to the courtesy of Dr. Jenner for the following very interesting case, which occurred lately under his care at the Children's Hospital. The case appeared to have some analogy to those of cancrum oris and noma, occurring as they do sometimes without visible cause in debilitated children; but it differed from any such case that has fallen under our notice in the extreme rapidity with which the disease developed itself and advanced to its fatal termination, and was remarkable besides as occurring at a time when the child's health appeared improved rather than deteriorated. *Post mortem* examination, it will be seen, failed to throw any light upon the cause of this singular affection; nor, indeed, would organic disease of any viscus, if it had been found, much facilitate the explanation of so rapid and entire a failure of the circulation. The case must stand as one of those rare instances that occasionally occur, in which the most extensive effects of disease are produced by a cause which our present knowledge does not allow us to discover, far less obviate, but which are worth putting on record as materials for study and reflection, and which may be further useful in a more advanced condition of the sciences of physiology and practical medicine.

As a contrast rather than an accompaniment to this case, we shall cite one that occurred a short time since in the wards of St. George's Hospital, and which illustrates the rapidity with which inflammations arise, and their rapidly fatal course in patients affected with disease of the kidneys. This latter case also terminated in gangrene, and the patient sank very rapidly after the development of this condition, if indeed the gangrene which showed itself on the last day of her life were not rather a symptom than a cause of the failure of the vital power. In this, however, there were many points of contrast to the gangrene occurring in Dr. Jenner's little patient. There was a manifest local cause for the inflammation, inadequate indeed to have produced any such result in a patient in sound health, but sufficient to originate formidable symptoms in one whose constitution was impaired by latent disease of the depurating organs; and this inflammation, again, would have a natural tendency to terminate in gangrene. This affection sometimes (though rarely since the improved practice in diffuse inflammation originated by Mr. Lawrence) leads to mortification of the skin from strangulation of the vessels which supply it. In Mr. Pollock's patient, such an event had been obviated by early incision; and the failure of the circulation from excessive debility was the obvious direct cause of the death of the skin. We hope to be able, on an early occasion, to illustrate, from the records of this and other hospitals, the frequency with which these low inflammations follow on disease of the kidneys and other viscera.

CASE. John Collard, aged 16 months, was admitted on January 8th. An attack of measles, ten days before admission, had reduced him to a very weak condition. An abscess had formed behind the right ear, and the conjunctiva of the left eye was intensely inflamed. It was afterwards discovered that his mother had suckled him up to the time when she left him in the hospital. He was placed on a tonic plan of treatment, and gradually recovered his strength, and was able to run about. The sinus formed by the abscess behind the ear led down to exposed bone; but, as his health improved, the discharge lessened, and ultimately the sinus closed. He had so much improved that, on March 28th, Dr. Jenner thought it advisable that he should leave the hospital, and accordingly discharged him. On the same afternoon, when the nurse undressed him to put him to bed (about 5 P.M.), she noticed that the toes on both his feet had become black, and that there were patches of a similar colour about the feet. She had changed his stockings at 2 P.M., and at that time his feet appeared quite natural. The child was seen about 5.30, and it was found that each foot, and about the lower third of each leg, were of a dark claret colour; this darker portion terminated suddenly in a well defined line, the skin above this appearing perfectly natural, not red, nor in any way altered. The temperature of both feet was considerably lower than of the other parts of his body. This change of colour rapidly extended itself up the leg, almost visibly, and by 8 P.M. reached nearly half way up the leg. At that time, a similarly coloured patch was found on the left elbow, and another on the hand. The child was evidently in no pain, but appeared restless and feeble. Stimulants were freely given.

March 29th. The gangrene had not extended further up the legs. There were several large bullæ about the feet, containing a dark sanious fluid; the patches on the arm and hand had spread a little, and a small patch had appeared on the side of the face.

The child rapidly beame more feeble, and died on March 29th.

On *post mortem* examination, it was found that the disease affected only the skin and subcutaneous tissue. The muscles appeared healthy, and there was no manifest disease in any internal organ, or in the blood-vessels.

ST. GEORGE'S HOSPITAL.

DIFFUSE INFLAMMATION AND GANGRENE FOLLOWING THE INTRODUCTION OF A SETON: DISEASE (INCIPIENT) OF THE KIDNEYS.

Under the care of G. D. POLLOCK, Esq.

ELIZA H., aged 23, had been an out-patient for some time under Mr. Pollock's care, for a cyst connected with the thyroid body; and, as this continued to enlarge, a small seton was introduced