1839 to 1848, the proportion of masons affected with phthisis to the total number of phthisis cases is as 1 to 71; from 1859 to 1868, the ratio of the same is as 1 to 56.5; and from 1869 to 1875 as 1 to 37. If it be objected that the total admissions are of too miscellaneous a character to afford a fair comparison, then we may restrict it to the factory operatives, and compare the number of phthisis cases in these two classes, when the figures stand thus:—The ratio of phthisis cases among masons to that of phthisis cases among factory hands during the ten years 1839–48, is as 1 to 19; during the ten years 1859–68 as 1 to 10; and during the seven years 1869–75 as 1 to 9. The proportion of masons to factory operatives in the town has ranged from 1 to 6 to 1 to 7; so that it would appear that, while the liability to phthisis among masons has nearly doubled within the last thirty years, it is not even yet so great as it is among the bulk of the working population in the town.

Such a result presents us with two problems to solve: 1. Why should granite working be an exceptionally healthy occupation? 2. Why should its character in this respect have so far changed?

One has only to look into a mason's shed to see that the occupation is a very dusty one. A glance shows the presence, particularly at the upper part of the shed, of a faint whitish cloud, while the fine gritty white dust that settles on every thing shows plainly enough the results of the workman's labour. Why should the fine gritty dust be so innocuous in this case, when similar dust does so much harm in other trades? The explanation seems to lie in the conditions under which the work is carried on. The mason works, for the most part, in long narrow sheds, completely open on one side; near this open side, he places the stone, and works with his face towards the light and air, and stooping, to a certain extent, over his work. He is, therefore, practically in the open air, the shed serving simply to protect him from wet; the dust is almost entirely above and behind him; while the muscular exertion necessary to wield his heavy tools is such as to keep him sufficiently warm to resist variations of external temperature.

I have inquired into the conditions of the trade with the view of determining the cause of its sanitary deterioration, and, in particular, I have endeavoured to ascertain whether the recent great development of the trade in polished granite might not have been in part the cause. I have failed, however, in tracing any part of it to this; the work of the mason is practically unchanged, and the polishing which is added to his work after his part is finished is effected entirely by machinery, and in that part of the work there seems nothing calculated to be injurious. The change seems to be mainly due to a change in the class of men engaged in the trade. For some time, and especially within the last five or ten years, there has been a great emigration of masons from Aberdeen. The high wages current in this trade in America has had the effect of draining it largely of its best hands, and the result is that the greater part of the flower of the trade has left the country. Their place has been largely taken by a class of young lads inferior in physical strength to their predecessors, and, therefore, unable to resist the exposure necessary to keep the work from being positively injurious. Formerly, the trade was largely recruited by stout, robust, healthy lads from the country; but this class is now becoming very scarce from various causes connected with the occupancy of the land, and weaker town-bred lads are taking their place. In short, the country labourer is being driven away by the concentration of land in a few hands, and the mason is being enticed away by high wages elsewhere, so that the *physique* of the trade is being changed, and a decided deterioration is the result.

DISEASES AFFECTING LEAD-WORKERS.*

By W. HOLDER, M.R.C.S.Eng., L.S.A.Lond.,
Surgeon to the Hull and Sulcoates Dispensary.

A PARAGRAPH in our JOURNAL intimating that it was intended to have a series of papers read on the diseases incidental to trades, brought vividly before me recollections of several cases of lead-poisoning which have been at times under my care during the last few years, more especially recalled to my mind two cases of the gravest nature, and determined me to try to attract the attention of the members at this gathering for a few moments to a trade disease, which, in my opinion, affects as seriously the human frame as any to which your attention may be directed—I refer to the manufacture and uses in trade of white-lead for paint. I am not unconscious in giving such an opinion of the destructive nature of diseases instigated and upheld by the inhalation of the grit and grinding which impregnate the atmosphere where cer-

tain trades are conducted; but, remembering this, and the horrors suffered by the *employés* in the phosphorus manufactures, I feel justified, after calm consideration and observation, in saying that lead-poisoning is one of the most baneful of them all; for it is not so merciful in its speedy destruction, its tortures are agonising and prolonged, and the lingering cachexia induced renders life useless and a burden to the sufferers frequently to the end of their miserable days. It should be understood that I refer, in this paper, not alone to the slight absorption of lead by the plumbers and painters, but chiefly (I may say almost absolutely) am particularising the ingestion of lead from the inhalations of carbonate of lead-powder in the whitelead manufactories, where sheets of lead are acted upon by the fumes of acetic acid and spent tan, which, corroding the metal, gradually convert the lead into a heavy white powder of carbonate and deutoxide of lead, which, when mixed with oil, is used as a paint and called whitelead. In the manufacture, manipulating, and packing of this substance, not only does the air breathed become impregnated by the deadly agent, but, the hands being in constant contact with it, it becomes absorbed also through the skin.

The labourers in these manufactories show truly the terrors of the trade: as may be imagined, only the poor and ignorant will work in this avocation; either their sense is so blunted by want or indifference, that they accept labour which is too sure to curse them, and to which, did we put our criminals, I venture to say we should quickly receive, and justly merit, the hearty condemnation of the whole civilised world, as Russia does for the political prisoners in her Siberian copper-mines. It is work such as is described by a writer as—

“Bare life he toils for here all day,
Surrounded by a dirty gray;
Bare life, all bare of joy.”

To those who have seen but cases of painter's colic and wrist-drop, although so formidable and grave, my criticism of lead-poisoning may seem too harsh, but, to those who have practised amongst these lead-workers, as I have done, I can confidently look for confirmation of my remarks. I need but recount two extreme examples from many cases as justification in themselves of what I have said. In December 1874, Bridget M., aged 27, a strong fresh-coloured Irish girl, came under my notice for treatment. She had been working at the lead-mills for only five weeks; she was suffering from severe colic, with constipation; this was relieved after a few days' suffering. She went again to her work, and, in about a fortnight, she returned to me with much more persistent colic, faintings, and constipation of the bowels. She was again relieved, strongly advised to be scrupulously clean and to drink plenty of the diluted acids prepared for them at the works. I saw her after this several times; after about seven months, the cumulative action of the lead produced paralysis, which gradually completely affected the left side of the body. When I again saw her, she was thus paralysed; the face was pinched and wasted; she was intensely anæmic: her hearing was much affected. From her appearance, she would then have been taken for nearly double her age; her suffering from colic was dreadful in its intensity; it came on intermittently, and resisted for some weeks treatment to cure it. When I last saw her, some months after I had given up treating her, the paralysis was in no way improved; the deafness was complete on the left side, hearing dull on the right; her teeth were rotting away; and, for all pleasures and purposes of life, she was blighted. I have lost sight of her for some time past, and could not find her before leaving home.

The second case was that of Margaret J., aged 38. This woman came repeatedly under my care. She had had many attacks of colic and constipation, for which she had been treated at the hospital; but her poverty (for their wages are small) barely allowed her to become relieved before she again returned to her work. At length, the constipation, pain, and weakness completely prostrated her; she was then compelled to seek medical aid at home. After I had again relieved her, and warned her of the consequences (her very cachexia seemed to be against her obtaining better employment), she returned to her former work. When I was next called to her, her condition was indeed pitiable; there was a transparent waxy-looking skin (which, in the women, I may say at first gives them a most beautiful transparent complexion); she had wrist-drop on the right side, which gradually spread up the arm to complete paralysis of the extensors; her lips were pallid; her eye bright and pupils dilated; she complained of her sight being dim; her forehead was covered with heavy beads of sweat; the bowels were aching and constipated; of course, she had the usual blue line on the gums, the teeth shaking in the sockets, covered with an ashy-grey slime; the breath was nauseous to the woman and horrible to all in the room with her. On my calling next morning, the aching bowels were still constipated and spasms heavy; a few days after, her sight became worse, and ultimately she became blind from amaurosis, for

* Read before the Medical Section at the Annual Meeting of the British Medical Association in Sheffield, August 1876.

which I can assign no other cause but the action of the lead. She was, until the last I saw of her, blind and paralysed. Her friends took her with them from the town, and I have no doubt that ere this she is dead or the inmate of the Chronic Paupers' Home, probably the latter; for, as I have said, this disease is slow to mercifully kill, but leaves a destroyed body to crawl through poverty and life with all the unhappy reflections such a condition of helplessness entails on the poor.* These two cases, abstracted from many, serve strongly to show why this disease should interest us, and in their instruction give us zest to turn from their depressing details and look upon what we may more callously consider the pathology and treatment of the disease.

I am aware that time will not permit me fully to discuss its pathology. I will then briefly lay before you what is known concerning it. Considerable attention has been paid to the subject by Drs. Burton, Fletcher, William Budd, Wilson, Parkes, Martin, and Hunter, in Great Britain; and MM. Andra, Duvergie, and Gubourt, De Hain and Louis, abroad. The result of investigations may be summed up as follows. Lead has affinities for all the tissues in the body, and can be detected in the tissues many months after it has first demonstrated itself, thus indicating how slowly it passes out of the system (*Dublin Medical Press*, 1874). Fletcher found, in the case of a man suffering from colic, as much as 4.8 grains of metallic lead in one hundred grains of solid matter in the urine. Some consider that it forms a chemical union with the tissues of the body. As I have said, death comes very slowly. As the direct result of this disease, Andra gives the number as one per cent. I should be disposed to put it even lower than that. In this disease, a persistent anæmia is excited; and I have noted that this and the cachectic habit leave them prone to fevers and ulcerative affections. I have often noted the marked effect lead has locally, the painter and plumber invariably only suffering from paralysis of the extensors of the arm when affected, which is usually preceded and accompanied, unlike other paralysis, by intense aching pain of the part affected. In these trades, they are constantly in their employment handling leads; they first complain of aching pain spreading up the arms, and ultimately ending in paralysis of the extensors. As a rule, sensation is not affected; here, in these cases, the nerve seems to lose its motor power by being locally inoculated by the lead: as the pain spreads backwards so the paralysis extends. On the other hand, in the lead-workers, where the system entirely is affected, where sight, hearing, general paralysis, and colic often show themselves, you have the ingestion into the lungs by vapour; you have the absorption through the skin, and too frequently through the stomach, through their habit of eating with unwashed hands, and the poison thus becomes attached to the food. When these paralysed muscles are examined, they are found yellow and soft; this has been looked upon as pathognomonic of the action of lead upon the muscular tissue, but may we not venture to suppose that it is chiefly the fatty degeneration usually accompanying disused muscle assisted in these cases by the great anæmia? for lead in the system is found to cause absorption of the red corpuscles, and induces an anæmia of the body. Dr. Garrod says that, "if lead be taken for a long time, it causes the blood to become impregnated with uric acid; and thus it is common to find gout, with its distressing enlargements, prevailing amongst those who have been affected by lead-poisoning". When *post mortem* examinations are made in those which have died in the colic, great contraction is found in the colon and sometimes in the cæcum; the bowels are often intussuscepted. In the cases where the body has been for some time under the influence of this poison, the diseased action spreads backward from the local seat of contagion or primary attack and goes on to permanent general paralysis, blindness, and deafness; the nerve-tissue is found to be affected; it is pale, soft, and aqueous; the brain-convolutions become separated by a semi-opaque fluid, and the convolutions themselves are much shrunken.

The treatment of this fearful disease in its early stages is simple and generally effectual. Small doses of sulphate of magnesia with diluted sulphuric acid and opium relieve the constipation and remove the colic by its supposed power of converting the poisonous carbonate into the insoluble sulphate of lead in the tissues; for it seems to be only the carbonate and oxide of lead that act so deleteriously. When the case becomes more chronic and obstinate, hot baths, Turkish baths, if obtainable, a pill made of one-third of a grain of morphia, with one-third of a grain of extract of belladonna, every four hours for twelve hours, is most efficacious in relieving the spasm of the gut. I have also used the interrupted electric current on the abdomen, alternated

with hot baths during a severe colic. After the administration of the above pill and mixture, with the happy result of affording relief to pain, which before, at a previous attack, was much more prolonged before being relieved, iodide of potassium in large doses of twenty grains, when the case assumes a chronic form, seems to act then the best. I may here mention that I have never had a case of iodism or distress since I have given these large doses, although some have taken that dose three times a day for months, whilst I have had two or three so affected who only had two to four grains for a dose. Whilst taking the iodide, I advise Turkish baths with precipitated sulphur, good and nutritious diet and porter.

I may here point out that faradisation is mentioned as a useful agent for diagnosis; for, under the influence of lead-impregnation, the excitability of the muscle is much diminished and frequently lost to this stimulus; and, as I have before mentioned, it is an useful remedial agent, if persisted with.

The therapeutics of this disease I believe I have exhausted. If the patient take the earlier warnings, I consider our armaments sufficient; but, if it be allowed to become chronic, I fear it is a disease of such rancour, that we are nearly vanquished. What long-continued generous diet would do we are not permitted to try, for these cases occur in the poorest classes. As a trade-disease, I presume it is inevitable; yet we cannot but look upon its ravages with pity; the patient might mitigate these ravages by scrupulous cleanliness, but the half-hour they have for breakfast cannot be considered sufficient to enable them to adopt the precautions they know to be requisite. It is, indeed, surprising to observe how many return to this employment, which has so often prostrated them.

I trust I have not wearied you; but, as I have said, I felt, in trade diseases, this was one of the first importance; I therefore determined to bring it before you when I saw it was not on the list by any other member, and I sincerely trust I have not taken up your time uselessly or without your approval.

ON THE ADMISSION AND RETENTION OF FOREIGN MATTERS IN THE LUNGS.*

By CHARLES ELAM, M.D.

My intention, in the following brief remarks, is to illustrate by some few cases the possibility of the reception by the lungs of foreign matter of sensible and even considerable bulk, and its retention for undefined periods, without the necessary and immediate production of urgent symptoms, the facts furnishing (as I hope) a not altogether unimportant or uninteresting contribution towards the natural history of the special local diseases of Sheffield.

Apart from the domains of surgery in relation to gunshot-wounds and accidents generally, into which I shall not enter at all, the literature of this subject is not extensive. With regard to the casual lodgment of bodies in the air-passages, much interesting matter may be found in Erichsen's *Science and Art of Surgery* and other systematic works of the same nature; but this is entirely apart from my proposed subject. I may, however, in passing, allude to a remarkable case which came under my notice some years ago, in which, during an epileptic attack, two artificial teeth were detached from the jaws and found their way into the right bronchus, where they remained, causing very urgent symptoms and ultimate death.

The general impression with regard to the lungs is that, although dust and very fine or impalpable powders may penetrate to them, yet generally anything of more sensible size and individuality is stopped at the larynx and rejected by the reflex functions of the glottis. As a general rule, this is correct; but it must, as will be shown, be received with limitations. It is further supposed that, in case larger substances do gain admission to the lungs, they cannot remain there long without exciting considerable local and general disturbance. This also is ordinarily correct, but, as one of my cases will show, is not invariably so. I propose, from a very large number of cases, only to allude to three on this occasion: the first illustrative of the retention of metallic particles in the lungs, the second to the retention of sand, and the third to the retention of coal, not in the form of dust, but of actual pieces of coal of sensible size. The first two are sufficiently common, I believe, to require but a passing notice; so far as I know, the third is unique.

CASE I.—T. S., aged 27, a fork-grinder, was the subject of the first observation in 1864. He had been subject for some years before

* I may here say that until after this paper was written, I did not know of any other recorded case of lead-amaurosis. In the *JOURNAL* of the 22nd of this month, one case is recorded by Dr. Reid and two others mentioned. Until I read of these, I fancied this case of mine was unique.

* Read before the Medical Section at the Annual Meeting of the British Medical Association in Sheffield, August 1876.