NOTICES
OF THE
EFFECTS OF LEAD
UPON
THE SYSTEM.

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AMONGST the numerous cases of colic and of paralysis, the consequence of the absorption of lead, which have fallen under my care in the General Hospital at this place, two cases have occurred with paralysis of the nerves of vision, a form of the disease which I have nowhere seen noticed by authors who have treated of the effects of lead on the system; as the plan of treatment was in both cases successful, I venture to hope that the communication of them to the Society will not be thought uninteresting.

The more usual seat of paralysis from lead, which is apparent to observation, is well known to be in the nerves supplying the flexors and extensors of the

wrists and arms, especially the extensors; and the plan adopted by Dr. Pemberton, of supplying splints on which to keep the hands and fingers extended, by which the continued extension of the extensor muscles is relieved, and their suspended power recovered, has often been tried with success, both alone and in combination with internal remedies. It is upon the same principle that I have adopted a remedial plan to restore the lost powers of the nerves of vision.

The action of light is the proper stimulus of the retina, and its continued action whilst the nervous expansion is paralyzed, is precisely similar to the continued extension of the extensor muscles of the arm and hand; as in this latter case, relieving the muscles from their continued extension by means of splints, has been found to restore their suspended power, so it was, by analogy, to be supposed, that by removing the stimulus of light altogether from the eye, the power of vision would probably be regained.

With this view a bandage was directed to be applied over the eyes, and constantly worn day and night, so as to preclude the possibility of any light acting upon the nerves of vision. The practice was followed in both cases with success.

We see a precisely similar effect arising from the application of the same principle, in an over distended bladder. The over distension takes away the power of contraction; whilst by emptying the viscus of its contents, or in some cases only by keeping it

empty, the contractile power of the organ is restored.

I proceed to give a short detail of the cases to which I have alluded.

December 27, 1833.—Elizabeth Clayton, aged 25 years, single woman, was admitted into the Hull General Infirmary. States that she has worked for seven or eight years in the lead works, and has never before been attacked with paralysis. She first perceived the approach of paralysis about six weeks ago. The hands were the first to lose their power; after about three weeks her eyesight began to be defective. The sight is at this time completely lost. The pupils are somewhat dilated.* Her legs are also affected with paralysis, but she scarcely knows how or when they became affected. She states that she has done all sorts of work in the lead works, but is of opinion that what is called “picking,”† is the

* In the instance of loss of sight, is the lesion in the optic expansion alone? Or is there also paralysis of the nerves supplying the iris? The effect of this latter, independently of the former, would be *indistinctness* of vision, in consequence of the admission of too much light to the retina, and also of the indirect rays.

† When lead, in its blue metallic form, is first placed in the earthen pots, it is rolled up or cast in forms, and placed over vinegar; it then remains for some time, (six or eight weeks,) embedded in manure and bark, which keeps it at a proper temperature for the action of the vapour of the vinegar on the metal. When first opened out for work or separation, there arises a heated vapour, which is thought by those employed in the works to be very pernicious. The pots are then taken out of the beds and carried to

most deleterious. The girls of the works are employed on this duty every other week only. The following medicines were ordered for her: A drachm of sulphate of magnesia, with two minims of laudanum, in an ounce of the compound infusion of roses, every four hours. Ten grains of the compound ipecacuanha powder at bed-time and a stimulating liniment to the neck and spine, and a generous diet.

She was in the house three weeks on this plan, without any improvement in the vision, though during this time her other paralytic symptoms were perceptibly improving. With a view to take off the stimulus of light from the nerves of vision, a bandage was then directed to be applied over the eyes, so as to exclude the light altogether. The bandage to be worn day and night.

On Feb. 14, 1834, the report is, "improves daily," can distinguish objects, but not clearly.

Feb. 18. Quinine ordered.

Eye-sight described by the patient as "rather thick." Her eyes vary much, sometimes "quite light." Can read large print,—made out-patient.

a table, to be "picked over." The lead is then unrolled, or passed between rollers and crushed, to force off the encrusted carbonate, or white lead of commerce. That which is white is separated from the metallic part, and it is this separation, or "picking," as it is called, which is found to be so pernicious. During the mechanical separation, by crushing, the finer portions of the carbonate will be suspended in the atmosphere, and breathed by the girls whilst employed in the work.

Soon after this she was discharged from the hospital, perfectly cured.

On June 10, 1835, Elizabeth Dyson, aged 18 years, was admitted into the Hull General Infirmary, suffering from complete loss of sight, with paralysis of the hands. States that she has worked nine months in the lead works, and has had colic several times ; that castor oil was always sufficient, in her attacks of colic, to remove the complaint.

A bandage, as before, was ordered over the eyes, and to be kept strictly applied, so as to exclude all light ; and the same plan of treatment was adopted as in the last case.

June 24th. Some power of vision returning ; better in her other paralytic symptoms.

July 8th. Eye-sight quite restored ; ordered quinine.

July 15th. Discharged from the hospital cured.

I may be allowed to add, that several cases of paralysis, without loss of vision, and numerous cases of colic, have also within the last nine years fallen under my care, both in the hospital and out of it. Those of paralysis, without colic, I have found, for the most part, hitherto to yield to the compound infusion of roses, with salts and laudanum. Whilst those of acute colic always give way to a steady perseverance in drastic purgatives, assisted by purgative injections.

In the milder cases, the old remedy, calomel, colocynth, and opium, in repeated doses, answers ad-

mirably ; whilst in the more severe cases, croton oil frequently repeated, until relief be obtained from the bowels, is more efficacious than any other remedy with which I am acquainted. The form and dose which in my experience is found to answer best, is two drops of the oil, with ten grains of magnesia, a drachm of mucilage, and an ounce of cinnamon water, every two or three hours.

I willingly bear testimony to the excellence of this remedy in cases which resist the milder and more common treatment, in overcoming what was formerly supposed to be spasm in the bowel ; but which we now believe, reasoning analogically from those parts which we have the means of observing, to arise from paralysis of portions of the intestine.

This state of the intestine, in the more severe cases, requires the most powerful drastics in order to induce the bowel to empty itself of its contents. It may admit of doubt in what way the effect is produced by drastics, whether as a stimulus to the paralysed part of the intestine, or to the more healthy part of it, by which so much increased action is induced, as to carry the contents of the bowel through and beyond the paralysed part. Certain it is, that the most powerful drastics are required, and are well borne by the patient.

Cases of Paralysis from the unsuspected absorption of Lead, in consequence of drinking rain water, kept in lead cisterns.

On the 18th of July 1837, I was requested by Mr. Craven to visit, in consultation with him, Mr.

Thackray, aged sixty-three years, residing in West Parade, near Hull, one of the Elder Brethren of the Trinity House of this port.

I found him labouring under paralysis of the upper extremities, and partial paralysis of the lower. The hands, with the palms turned inwards, hung by his sides, and rather forward, perfectly powerless, rather swollen, and of a lived hue. He had no power of moving the fore arm, nor of rising from his chair without assistance. When he walked to his bedroom, he required the assistance of a servant on each side of him, and then his knees bent under him, and his gait was tottering. His voice was a good deal altered, and the control over the tones of the voice much impaired. His countenance was blanched, but not sallow; the functions of the brain, as an organ of intellect, not interfered with. He complained of great pain in the lower part of the body, accompanied by costiveness, and of pain across the legs and arms. He would frequently shed tears from slight causes at our visit to him, as we constantly see in patients paralytic from disease and lesion in the arterial system.

I learnt from Mr. Craven, that his bowels acted only every three or four days, and then only in consequence of having taken active medicine; that, in a former attendance, eighteen months previously to my being called to attend him, Mr. Thackray had an epileptic seizure. During the fit he fell out of bed, and dislocated the left shoulder, since which period he has not been affected with epilepsy.

The fact, that the sister of Mr. Thackray's late wife, who lived in the house with him, was last year attacked with paralytic symptoms, precisely similar to those of her brother-in-law, excited my attention, as a remarkable coincidence. These had supervened upon a debilitated constitution, which had for some years shown signs of giving way. She died paralytic, without any cause of the paralytic symptoms having been made out.

As there was no relationship by blood between them, it appeared to me more than probable, that some common agent existed as the cause of the symptoms in both.

On inquiry, it was ascertained that the water used by the family, and which was supposed by them to be more pure than any supplied to the town, was rain-water, collected from the top of the house by means of lead gutters, and received into a cistern lined with lead. It was filtered for use, and had a sweetish taste, which had been often remarked by the servants. On testing the water in conjunction with Mr. Robert Craven, agreeably to the recommendation of Dr. A. T. Thompson, we obtained distinct evidence of the presence of lead.

It was now deemed advisable by us to call in to our assistance Mr. Pearsall, a most able chemist, to determine the precise condition in which the lead existed, and the proportion contained in the water.

On examining the sides of the cistern, in conjunction with Mr. Pearsall, and scraping them with the nail, the white carbonate of lead was abundantly

manifest, especially in the angles of the cistern, where the soldering had, probably by galvanic action, assisted and expedited the change. Efflorescence was here distinctly to be seen.

It was now pretty evident that the source of the paralytic symptoms was lead in the water; and, in consequence, Mr. Thackray was immediately put on a similar plan to the cases which I have already detailed, viz., compound infusion of roses, with sulphate of magnesia and laudanum, and a generous diet allowed, with stimulus in moderation. Subsequently quinine, strychnine, frictions, and electricity.

I am happy to have it in my power to say, that Mr. Thackray is now able to walk almost any distance, to use his arms pretty well, though he has not regained, and probably never will regain, complete power over the wrists and fingers.

He is now able to enjoy life, which was previously becoming a burden to him; and he is very grateful for the providential discovery of lead in the water used by the family, and which is now entirely discarded for culinary purposes.

Many of the usual symptoms were manifested in the servants, but in a minor degree; they have been, more or less, tormented by colicky pains, and by constipation; but not having resided for any long period subjected to the influence of the water, it was not to be expected that they would be affected with the more chronic symptoms, as paralysis, &c.

It is worthy of notice, that it was always re-

marked that when Mrs. Martin (Mr. Thackray's sister-in-law) went on a visit into Lincolnshire to her native air, she recovered wonderfully from her paralytic symptoms, and came home much invigorated and restored; but on her return to Hull, the symptoms of paralysis soon returned. The action of lead on the system was not at that time suspected.

This fact accords, however, with our observations on the general action of this poison in the system in those whose pursuits and avocations lead them to handle it, or to be amongst it. In painters we witness an aggravation of symptoms on a return to their accustomed employment; even the wearing of unclean apparel has been supposed to re-induce the disease in those who have recently suffered from it.

This is also similar to the specific action of other metals on the system. It is well known that a single dose of mercury is sometimes sufficient to re-establish ptyalism in an individual recently affected constitutionally by the metal.

NOTE, by Mr. Pearsall.

A CHEMICAL examination of the bottles of water submitted to me having fully shown lead to be present by the ordinary tests, and having adopted Dr. Christison's view of the action of pure water upon lead, the next question of importance was the amount of lead in the water. In the course of ex-

periments, the following case occurred, which will at once show the uncertainty of investigation, and afford a strong caution against hasty observations. I found by tests that the quantity of lead was subject to variation; and on one occasion I went to the cistern in company with Dr. Alderson. The rain-water in it appeared clear and transparent; one bottle was filled; then, as the cistern was known to be dirty, the sediment was agitated with the water, and a bottle filled with the now muddy fluid. On the following day the waters were tested for lead; the bright water gave abundant precipitate; the other water poured from the subsidence was clear, and did not exhibit a trace of lead; but the black sediment contained this metal in large quantity, for the deposit, boiled with pure nitric acid, and the excess of acid driven off or neutralized, the filtered fluid was found to be a strong solution of a salt of lead.

Most important consequences are evident from this fact: first, that the quantity of lead may and does vary with the substances accidentally or mechanically present in the water; and thus a family may be subjected to the deleterious effects of lead in water; and then the lead may be suddenly removed by agitation, as by a shower of rain; and, next, that water may be examined and pronounced pure and free from this metal, and the cisterns unacted upon, when indeed the waters may generally be charged with lead to a dangerous extent when used for ordinary purposes. Hence in all cases it

is absolutely requisite that the deposited matter in cisterns and tanks be examined, by digesting the sediment with pure nitric acid, or some other acid of known purity, capable of forming soluble salts of lead, and determining the presence or absence of lead by the usual tests of sulphuretted hydrogen, &c., &c. The quantity of lead obtained by sediment from clear water which showed abundance of lead before agitation, I found, from one gallon of the muddy fluid a precipitate equal to about 13·866 grains of metallic lead.

I am aware that there is the received opinion that the lead is mechanically suspended; and indeed water with lead in this peculiar state cannot be passed through a paper filter without being deprived of nearly all the lead; a second filtration will sometimes remove nearly every trace; but if sulphuretted hydrogen be added to the filter, it will afford decisive evidence of lead being detained upon the surface of the paper. I am inclined to believe that the lead is held in solution by chemical affinities; but these are so feeble, that foreign bodies are capable of destroying the combination by minute causes, whose actions, although obscure at present, yet are well known by producing similar effects. I may mention, that undoubted chemical compounds are known to have their energetic affinities destroyed, and new substances formed, by the mere act of filtration through organic bodies, such as paper. Manganetic acid, oxy water, are among the well-

known instances to be found in the works of the most eminent chemists of the present day.

During my experiments, I have found that bright waters impregnated with lead, retained it after being kept for fourteen months in bottles, which were occasionally opened, the tests seemed to show but little difference in the quantity; nearly the whole of this lead could be removed by agitation, with carbonaceous and earthy matters.

T. J. PEARSALL.