of examinations. On the contrary, the official doses in these directions too often appear exclusively to hold the field. The result, if the earlier argument of this paper is sound, cannot fail to be, and as a matter of fact is, unfavourable to that condition of successful prescribing which demands adjustment of the dose administered to the personal idiosyncrasies of the patient.

Thus, whilst in the interests of the public safety it may be necessary to allow the *Pharmacopoeia* to continue to print a maximum dose for each of the official remedies used for internal administration, these doses should be presented in their true relationship and should be deprived of any orthodox halo which the accident of their position may appear to attach to them. Towards the same end it is advisable that strenuous resistance should be offered to any attempt to make the *Pharmacopoeia* other than an authoritative interpretation and definition of the meaning of terms currently used in physicians' prescriptions. And, in particular, no countenance should be lent to the ambition to make the *Pharmacopoeia* a collection of remedies boasting the possession of a pharmacological guarantee, or to include in that volume a series of therapeutic directions and suggestions. It is in the interests both of the public and of the profession that the individual practitioner shall accept personal responsibility alike for the remedies he uses and the doses in which he prescribes them, and these ends would not be favoured by the appearance of a volume claiming public and authoritative therapeutic sanction. So long as the national *Pharmacopoeia* is kept in its present comparatively humble position the existing practice of stated doses may be permitted, provided that due note is taken of the dangers involved, and adequate measures are adopted to prevent what is a convenience for the prescriber and dispenser being converted into a restriction on practice. In short, an official dosage must be recognized as a possible danger to free and responsible personal prescribing, unless at the same time its functions and purpose are strictly limited and defined, and emphatic proclamation is made of the truth that scientific and fruitful indications for practice are to be found, not in the general terms of the doses stated in a *Pharmacopoeia*, but in careful and thoughtful study of the personal idiosyncrasies of the individual patient.

INDUSTRIAL LEAD POISONING.

AN ACCOUNT OF AN OUTBREAK AMONGST YARN WORKERS.

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In view of the efforts that have for many years been made by the Home Office to limit the extent of lead poisoning as an industrial disease, by means of special rules, supervision, and notification, I think it worth while to publish some particulars of an outbreak in a calico printing works, or rather amongst the packers in the yarn-dyeing department. Outbreaks of the kind have occurred before in a precisely similar manner, and from the same cause—the inhalation of the lead-impregnated fluffy dust thrown off from hanks of yarn dyed by chromate of lead, as the workers—always women—shake them out and bundle them for the packers, a process called “noddling.” In the final report of the departmental committee appointed to inquire into and report upon certain miscellaneous dangerous trades, issued in 1899, much evidence was taken on this subject, and reference was made to an extensive outbreak at one factory five years previously, in which twenty girls had to leave work at one time. What happened before the days of factory legislation one can only conjecture.

Like all other lead poisoning on a large scale from handling yarns, the trouble in this case came from the heavy orange yarns. Other coloured yarns into which chromate of lead enters—such as the greens and light yellows—appear to contain in the dust which can be washed off by water a negligible quantity of lead, and an elaborate investigation by Dr. Dupré of similar samples submitted to him some years ago showed that whilst from light yellow and green yarns he could obtain only 0.03 per cent. of dust, or 1 lb. per 3,300 lb. of yarn, with a minute trace of lead only, from heavy orange yarn he could wash

0.29 per cent. of dust, or 1 lb. per 345 lb. of yarn, containing 2.85 per cent. of lead.

DYEING, DRYING, AND NODDLING.

The yarn is first washed and boiled, then passed through lime water and the excess wrung out. It is next put through a solution of subacetate of lead—and here obtains that which may afterwards cause trouble—then again through lime water to fix the lead more or less in the fibre, and through a saturated solution of potassium bichromate, and finally of hydrochloric acid to raise the colour, and of safranin to top it. The yarn is then dried in a hot-air chamber, and afterwards hung in a current of air to cool and to obtain a natural amount of moisture. It is then stacked for making up. Up to this stage the procedure has been entirely in the hands of men, and is a fairly safe one; no cases of lead poisoning have been traced to the dyeing process or to the handling of the yarn when wet. It is entirely in the later stage of making ready for packing that the trouble arises.

After the yarn has been dried it becomes the turn of women to handle it. They take hanks from the stack, and hang them over wood bars, and shake out and stretch them straight, so that they may be passed on to the men who press and pack them. It is in this “noddling,” this shaking out and violently stretching of the hanks of yarn over the wooden bars, that the lead-laden bits of cotton fibre and dust are liberated, and float about the workroom, impregnating the atmosphere and producing a fine cloud of yellow dust. In this instance about twenty women were occupied in the process, consequently the amount of this yellow dust was considerable, and, though the room was very large and high, the dust is heavy, and settles on their white overalls in quantity.

PREVENTIVE MEASURES.

The firm worked under special rules dating from 1895, but had not considered it necessary to adopt the recommendations contained in the report of the Dangerous Trades Committee, published in 1899, as to periodical medical examination, which would have brought to light the early cases as they arose. They supplied overalls and head coverings, which were washed periodically. No food was allowed to be eaten in the workroom. Washing conveniences and an adequate supply of water were provided in the workroom, as also were adequate metal respirators lined with a sufficient quantity of lintine, or fine lint, a very suitable filter. They had also arranged a trough in the floor, covered by a grating, and connected up with a fan, to try and remove the dust. The women worked in this department on alternate weeks. In spite of these things, and notwithstanding that the firm had told off one of the senior women to see that the washing was properly carried out, the women were very indifferent in the matter.

Fig. 1.—Workroom, showing fan.

Since the affected cases have come to light they have been permitted to cease work one hour earlier, that they might not require to encroach on their own time in order to wash their hands and faces; nevertheless, we found many of them leaving the works with half-washed hands and chrome-laden finger-nails. They would appear to

differ in no respect from other workers in dangerous trades. To imagine that they will seek their own salvation from lead poisoning, if it entails the slightest trouble, is to imagine a vain thing. The same difficulty applies to the wearing of respirators. They do not keep them on continuously. When the foreman turns his back they are removed, or, at any rate, sufficiently removed for the purpose of conversation. It would be to foster a delusion to expect twenty young women to wear apparatus which would act more or less as a muzzle, and prevent them from talking for a fraction of eight hours a day, even though the consequences were as disastrous as they were to a number of these women.

The only course to pursue was the one adopted when the trouble was found out. At one end of the workroom a 25-in. fan (Fig. 1) was erected on the ground level and closed in except at the bottom, where it was open to a covered trench 2 ft. deep and 18 in. wide, which passes round the

Fig. 2.—Workroom, showing hoppers.

side of the room, and over which, at intervals, hoppers are placed (Fig. 2), and over these the wood bars for "noddling" the hanks of yarn. All this is partially covered in (Fig. 3), so that during working hours, when

Fig. 3.—Hopper, showing wool on bars.

the fan is in motion the in-draught through the hoppers takes with it nearly all the dust, which is driven by the fan along an upcast shaft and conveyed outside the building.

The workpeople are provided with and expected to wear the respirators as well. Some years ago Mr. Rogers, then H.M. Inspector of Factories in Manchester, instituted an inquiry into the amount of lead taken up by respirators in this stretching and bundling process of dried yarn. He took two periods of three hours' work under exactly similar conditions, with the exception that in one the exhaust fan was stopped and the work done under the old conditions. The results were that when the fan was working the respirator was found to contain 0.0034 gram of metallic lead; when it was not working the respirator contained 0.02 gram of metallic lead. Whilst this shows

the great efficiency of the dust-extracting arrangements in that instance, it shows also that respirators are still of some use.

CASES OF LEAD POISONING.

The 9 cases of poisoning which occurred present no points of particular individual interest worth recording; they were all examples of chronic lead poisoning; there were no symptoms in any of them which could be attributed to chromic acid. One or two suffered from superadded acute exacerbations, and, although there were men engaged in the same workroom continually—that is, not in alternate weeks as were the women—none were at all affected. All the cases were amongst the women—additional evidence, if any were necessary, of the greater susceptibility to lead poisoning of women. Two of the cases were of the encephalopathic type, both added acute epileptiform attacks to their chronic symptoms, to which, up to then, they had not apparently given much thought, and both were unconscious for the first three days of the seizure. One of these was affected with so severe a neuro-retinitis that for two or three weeks she was entirely blind. Three others developed more or less wrist-drop; all ultimately recovered sufficiently to follow other occupations in the same works.

UTILITY OF PERIODICAL MEDICAL EXAMINATION.

The utility of periodic medical examinations of the workers in these yarns was well shown in this instance. Hitherto none had been thought necessary. The firm had not been cognizant of any cases of lead poisoning having arisen amongst the workpeople; but it has since been found that isolated cases had come under the care of various medical practitioners in the neighbourhood from time to time. Where many women are engaged in many departments it is quite a usual and understood thing that there will always be absentees, sometimes the reason given will be a sick child, at others a sick headache; others, again, are left to be understood. When two or three women sent word they were not feeling well enough to return to work nothing was thought of their absence. They did not apparently seek medical advice in the first instance; at any rate, if a positive diagnosis was made it was not notified; the matter was brought to light by one of the women falling in convulsions in the street, and being removed to the hospital. The intense yellow chromate pigmentation of her hands and the condition of her gums caused further inquiries to be made and the case notified. When this became known amongst the other absentee sick women, they all referred their ailments to their medical attendants, and thus the extent of the epidemic became known.

Periodic examination would have revealed the earliest symptoms in all these cases, and would have prompted the earlier adoption of the measures which were afterwards taken, and which apparently have put an end to the trouble.

CONCLUSION.

It is not all yarn that is dyed a heavy orange colour with chromate of lead that is equally liable to give off lead-laden dust. Yarns that are so dyed for the home trade are usually passed through a sizing of starch which fixes the chromate of lead to the yarn more securely and lessens the tendency to fly in the "noddling" process; these yarns command a somewhat higher price in the market. For the Eastern trade, however, for which these particular yarns are destined, the price is cut so fine that they are not sized, the extra labour and material would cut away the small profit. The two classes require to be distinguished, as lead poisoning must be very rare in the former class.

I pointed out above that all these cases occurred in the handling of the dry yarn, and that there is no history of any cases having occurred during the dyeing process. Cases of chronic poisoning of the skin, with its peculiar and characteristic punched-out ulcers, topically termed "chrome holes," are met with from time to time, but not lead poisoning. The same may be said of calico printing itself.

In this district are very extensive calico-printing works, and several thousand hands are employed, but though lead is used in various dyes we never meet with lead poisoning amongst calico printers or in those who handle the cloth. If it occurs at all it must be in extremely rare and isolated instances. There may be a theoretical risk when the

printed calico has passed through the drying machines and is being folded, but though this folding is done by boys who might be considered more likely to be susceptible than adults, there nevertheless appears to be complete immunity.

The cloth is of course more quietly folded; it is not pulled about and shaken as yarn is, and moreover the dye is more closely incorporated with the fibre of the cloth by the heavy printing-machine rollers, and perhaps never more than one-eighth of the cloth is dyed with lead salts. It is not, therefore, easy to see why the Committee on Dangerous Trades should have placed print works under the same category as dye works in their recommendations.

It is quite clear that dyers of chrome yarn should be placed under special rules, especially those who dye for foreign markets, but the absence of the same elements of danger in calico printing would scarcely seem to warrant its inclusion under the same head.

HEREDITARY SYPHILIS AND ENTERIC FEVER.

A CASE WITH COMMENTARY.

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A GIRL, aged 19, was admitted to hospital on September 14th, 1905, in the second week of enteric fever. Numerous rose spots were present on the trunk, the spleen was enlarged, and the stools were "pea-soupy." The blood furnished a positive Widal's reaction. The diazo and methylene-blue tests were also positive. The fever took an uneventful course, the evening temperature reaching normal on the forty-first day.

On the forty-eighth day, when convalescence appeared to be firmly established, the patient complained of pain in the lower jaw. A small spontaneously painful and tender swelling was found attached to the left inferior maxilla just in front of the angle. The skin over the swelling was red and marked by a small cicatrix, the result of a fall many years before. The temperature that evening and the next few nights was 99°, and did not rise any higher. Apart from the local discomfort, the patient felt quite well. A mixture, containing 10 gr. of potassium iodide, was administered every four hours. No local application was used. The following day the swelling was no longer spontaneously painful, and was less tender, and in the course of the next few days gradually subsided, so that by the end of the week nothing could be felt beyond a slight thickening of the bone. The iodide was therefore reduced to 10 gr. three times daily, and, when the thickening of the bone was no longer palpable, omitted altogether. Almost simultaneously with its omission the patient began to complain of "rheumatic" pain in the right arm, which came on soon after she got into bed. The pain did not, however, at first keep her awake long, and when she awoke the next morning the pain had entirely gone, and did not recur till the following evening. Examination of the arm during the daytime revealed nothing abnormal, while at night no local enlargement nor tenderness could be discovered. The general health was in no way affected, nor was the temperature at all raised. As, however, the pain became worse on subsequent nights, the iodide was resumed, this time in 15-gr. doses thrice daily, and the nocturnal pains were considerably relieved. The patient was discharged from hospital on November 7th after a stay of fifty-five days.

On admission she stated that she had suffered from severe rickets, but the tibiae revealed the characteristic deformity due to hereditary syphilis, the bones presenting a symmetrical hyperostosis of the anterior portion of the shafts, which has been likened by French writers to the blade of a sabre. There were no Hutchinson's teeth, but the dentition showed the following lesions of nutrition, which, as Fournier* has shown, though not peculiar to hereditary syphilis, are more frequently found in that condition than in any other:

1. Minute dark erosions and white transverse grooves on

the crowns of the upper central and lateral incisors and the right lower first bicuspid.

2. A symmetrically oblique implantation in the jaw of the lower lateral incisors and lower first bicuspid.

3. Microdontism of the left upper first bicuspid.

4. Numerous extensively carious teeth.

Further evidence of hereditary syphilis was present in a high arched palate—the *palais ogival* of French writers. Otherwise the skull showed no stigmata of hereditary syphilis. The nose was well shaped. The complexion, though not florid, could not be considered pale. There was, in short, nothing in the physiognomy to suggest a syphilitic taint. Such cases, as Mr. Hutchinson has shown, do occur every now and then. In this connexion it is well to bear in mind the words of Parrot, who, after cautioning his readers against the exaggeration of Trousseau's classical description, states that in the immense majority of cases subjects of hereditary syphilis have nothing peculiar in their facies, and after the first few months of life often exhibit the signs of the most perfect health. Examination of the liver and spleen, as soon as the typhoidal enlargement of the latter had subsided, was negative. There were no active skin lesions nor any suggestive cicatrices. No interstitial keratitis nor deafness existed. There was no mental impairment nor any other sign of backward development. The patient was an only child, and the parents, of whom she knew nothing, were both dead, so that confirmation of the diagnosis by examination of the rest of the family was impossible.

The most interesting feature of the case is the exact nature of the periosteal swelling. How far was enteric fever responsible for it? Periostitis, since it was first described by Sir J. Paget in 1876, has become a well-recognized sequela of enteric fever. It is, however, by no means common. Keen, in 1896, had collected only 110 cases. The statistics of the Metropolitan Asylums Board hospitals, in which over 1,000 enteric cases are treated annually, furnish a percentage varying between 0.96 and 1.9 for the past six years, or a total of 99 cases. Without a bacteriological examination, which in the absence of suppuration the interest of the patient did not justify, a definite answer to the above question cannot be given. The onset of periostitis in convalescence from enteric fever without disturbance of the general health was noted by Paget, and subsequently by later observers, as characteristic, and is well exemplified in the present case. Specially remarkable is the unusual localization of the periostitis. In 216 cases of bone disease following typhoid collected by Keen, only 2 occurred in the lower jaw.

Determination of the periostitis to this point may have been produced partly by the scar, partly by the presence of a molar which showed commencing caries, these two circumstances constituting a *locus minoris resistentiae*. Thus Keen quotes a case of post-typhoid necrosis of both tibiae at the site of old lesions marked by a strumous scar. No recent external injury, as in some of the cases of typhoid periostitis, had occurred to my patient.

That syphilis was concerned in the production of the periostitis was shown by the remarkable readiness with which the inflammation yielded to specific treatment. The inefficacy of potassium iodide in the ordinary periostitis following uncomplicated typhoid was strikingly exemplified by a patient who was under treatment for enteric fever at the same time. No history or evidence of syphilis was obtained. Periostitis of the right tibia developed on the fifty-fifth day. Iodide was administered from the first, but in spite of a temporary improvement, suppuration occurred, requiring surgical treatment. The osteocopic pains from which the patient under discussion suffered, though not uncommon in acquired syphilis in the secondary stage, especially in the female sex, have received but little attention in descriptions of the hereditary disease. The nocturnal restlessness of children suffering from congenital syphilis has, it is true, been attributed by Dr. E. Smith to periosteal pains, but in the absence of appreciable lesions of the bones, and in view of the inability of the patients to express what they feel this can only be conjecture.

As in acquired syphilis, the pains in the bones may be associated with an appreciable lesion, or, as in the present case, pain may be the only symptom without any obvious signs of local inflammation. Writers on syphilis from

* Recently C. F. Marshall has insisted more strongly than Fournier on the heredo-syphilitic origin of these dental malformations.