very susceptible to slight chills, so that precautions which would be successful enough with an ordinary child are not effectual with them.

ON DRUG IDIOSYNCRASIES IN RELATION TO OFFICIAL DOSAGE.*

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THE personal factor provided by the individual patient forms an element in medical practice the range and command of which can hardly be overstated. It weighs largely in the choice of a physician and sometimes with equal unreason determines his dismissal; it modifies the expression of the processes of disease and thus complicates the art of diagnosis; and last, but by no means least, it influences the actions of medicines and therefore demands an attempted estimate in the construction of a scheme of treatment. Hence it must ever remain true that the prescription of remedies in the treatment of disease can never become a mere mechanical art. For even when remedies have been accurately accommodated to definite and exact standards patients will continue to differ, and this difference will express itself in a more or less conspicuous fashion in the shape of a varying response to the influence of drugs.

The existence of idiosyncrasies in relation to drugs is a doctrine which, it is true, receives some measure of recognition in the discipline of medical education. But it may be questioned whether it might not advisably be presented with greater emphasis. For the most part it is illustrated by the announcement that occasional individuals are found who are excessively susceptible to, or extraordinarily tolerant of, some few of the more potent agents among the official materia medica. Thus drug idiosyncrasies are presented as extraordinary or exceptional occurrences which appear as "sports" amidst the generally stable and constant phenomena of the therapeutic world. So far from being merely extreme expressions of a general law, these illustrations seem to be the negation of all law. They are apt to appear, like so many big gooseberries, to enliven the dull season of a course of lectures on materia medica, rather than to enforce a practical therapeutic lesson. So considered, it must indeed be admitted that instances of unusual sensitiveness to such remedies as opium and arsenic have this value, namely, that they teach the student and junior practitioner to be careful in the use of these remedies. But it is submitted that this is only a limited application of the significance of such facts.

The suggestion is here offered that these facts are merely extreme and conspicuous examples of the general truth that every individual patient has a degree of reaction, special and personal to himself, in relation to each member of the materia medica. The majority of individuals may, it is true, closely approximate in this respect to a common standard, but between the extremes of excessive susceptibility and excessive tolerance all gradations are possible, and successful therapeutics largely consists in the determination of the exact position of the individual patient in relation to the individual remedy. The probable truth of such a statement may well be expected *a priori*. If one individual is found to react powerfully to a minute dose of atropine, for example, whilst another receives a relatively large dose without manifest change, it is at least probable that individuals exist who form a graded series between these two extremes. And equally it is probable that what is true of one drug—for example, atropine—is true in a greater or less measure of all others. Such a conclusion, further, has the support of experience, and hence it seems desirable to emphasize conspicuous drug idiosyncrasies not as extraordinary and exceptional occurrences, but as impressive illustrations of a general law, the existence of which applies over the whole field of drug administration. Such a presentation involves an exhortation to the prescriber to free himself from the yoke

of a rigid and authoritative scale of doses, and to make himself ready, both in one direction and the other, to adjust his quantitative orders to the idiosyncrasies which exist, not in exceptional cases only, but in each individual patient.

The question now to be asked is, What influence is exerted upon the view of drug idiosyncrasy as just defined, and upon the practice which is the inevitable outcome of such a view, by the erection of an official scale of doses in the national *Pharmacopoeia*? The first remark which arises on such a question is that the two schemes appear to be in absolute opposition to one another. In one flexibility, and in the other rigidity, is the predominant note. It is submitted that as a matter of fact the pharmacopoeial doses do exercise a prejudicial influence upon the habit of the practitioner in the quantitative adjustment of his remedies in dealing with the individual patient. These doses are for the most part committed to memory by the student in anticipation of the demands of the examiner. A similar consideration determines their appearance in the pages of the current manuals of materia medica and therapeutics. And the examiner, it may be hinted with all due deference, not infrequently adopts an attitude which justifies these procedures. Thus in the early and flexible phases of the practitioner's career a more or less arbitrary scheme of doses is stamped upon his memory, and these are the more impressive as they appear to have an authoritative sanction. Is it surprising to find that in many cases these powerful influences exercised on plastic and receptive minds become stereotyped as the habits of a lifetime, and the rigid rules which may be necessary for the inexperienced remain to limit the freedom of the man of full stature?

It is therefore argued that the existence of an official scheme of doses, so far from favouring the cultivation of a free and responsible personal judgement in the selection of the quantities of remedial agents suitable for administration, tends to oppose such a habit, and to encourage mechanical and arbitrarily-restricted methods of prescription. It suggests to the practitioner an appeal to authority rather than a study of the personal peculiarities of the patient, and it indicates a limitation of dose by precept instead of by physiological and therapeutical effects. The dangers of over-dosage attract many warnings, but who shall tell the disasters which have attended the timid and restricted prescriber? If, therefore, as will be admitted, the careful adaptation of remedies, both qualitative and quantitative, to the wants and idiosyncrasies of the individual patient is an essential part of good practice, and if, as will also be admitted, each individual patient has his own claims in this respect, it is obvious that conformity to a stereotyped scale of doses is out of harmony with the liberty and power of scientific prescribing. In other words, the existence of a scale of official doses encourages neglect of some of the conditions which favour the successful use of drugs in the treatment of disease.

Now the logic of all this would appear to be an appeal for the removal of the official doses from the pages of the *Pharmacopoeia*. Were the desired end to be attained only by such a step, the present writer would not hesitate to adopt it. At the same time, it would have to be recognized that this policy would remove one of the arrangements by which an accidental error in dosage is prevented. The existing plan affords an added protection to the public by forming a platform on which the dispenser can approach the physician should the latter by a slip of the pen have ordered a dose manifestly excessive and dangerous; and, in view of this, the suppression of the official doses cannot be lightly advocated.

Further, it may be urged that the disadvantage which is attached to their existence, and which has already been discussed, may be avoided by a method short of wholesale abolition. These stated doses may remain as a convenient opportunity for communication between the dispenser and prescriber, but they should be plainly recognized as having little other significance. In particular, they should be deprived of any suggestion of official force. In the preface to the *Pharmacopoeia*, it is true, the real position and significance of the so-called official doses is recognized and defined. But the limitations and qualifications there introduced are not vividly before the minds of medical students, nor are they always emphasized in the manuals of materia medica or in the discipline

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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