

DOSAGE:

SOME SUGGESTED AMENDMENTS IN THE MANNER
OF STATING THE DOSES OF MEDICINES IN
THE BRITISH PHARMACOPŒIA.

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THE presentation in the British Pharmacopœia of official doses of all medicines used for internal administration has one practical advantage—it forms for the public an additional safeguard against possible error. In the absence of such doses the dispenser has no authorised avenue through which he may approach the physician to seek the confirmation or correction of a dose which *primâ facie* appears to be excessive. As safety in the framing and dispensing of prescriptions is of large public interest, it is not unreasonable that the national Pharmacopœia should provide machinery by which an accidental error on the part of the prescriber may be checked and remedied. This is the one valuable function which the pharmacopœial doses discharge. They put the dispenser in a position to secure the correction of an excessive or dangerous dose due to a miscalculation or slip of the pen committed accidentally by the prescriber. In this way they promote the safety of the public, and hence are capable of defence on the broad ground of the general interest.

There is, however, something to be said on the other side. The creation of an official dosage is not an unmixed boon. On the contrary, it involves certain disadvantages and dangers; and the claim here to be submitted is that it is the duty of the Pharmacopœia to provide safeguards against the risks which its official scheme of doses calls into existence.

The Mischiefs of Pharmacopœial Doses.

The chief count in the indictment which may be urged against the existence of pharmacopœial doses is that they tend to hinder liberty of prescribing. Appearing in a volume enjoying a definite legal status, they acquire, almost inevitably, a certain official halo and sanction. So dignified, they are carried from the Pharmacopœia into the text-books of materia medica and therapeutics; and they form the general standards of examiners. Hence the medical student becomes accustomed to regard such doses as authoritative; and even the prescriber, influenced by his early habits, remains in greater or less measure sensible of their restraining influence and feels more or less acutely the advisability of keeping his prescriptions within the limits of the official figures. But efficient and successful prescribing is not cultivated by adherence to a system of rigid rules; it demands, rather, the adjustment of doses of selected remedies to the needs, peculiarities, and idiosyncrasies of the individual patient. Dangers no doubt attend excess, but equally they attend defect. Against the one there are constant warnings, but the mischiefs of the timid and officially restricted prescriber are rarely recited. These mischiefs, it is here contended, the existence of a scheme of official doses tends to excite and maintain. It is therefore a fair claim that the promoters of such a scheme should take steps to avoid the harm of which it is capable. In short, the doses of the Pharmacopœia ought to be presented in such a fashion as to indicate clearly

that, while useful as an opportunity for discussion between dispenser and prescriber, they have no jurisdiction over the judgment and freedom of the physician.

That this is the true aim and purpose of the pharmacopœial doses there can be no question. In the preface to the official volume it is plainly stated that these doses "are not authoritatively enjoined," and that "the medical practitioner must act on his own responsibility as to the doses of any therapeutic agents which he may administer." But, buried in a preface, these statements are rarely revived as active and urgent doctrines. They seldom, if ever, penetrate into the manuals of materia medica and therapeutics, and probably many students pass through the curriculum without hearing of their existence. It is therefore no exaggeration to say that the intention of the Pharmacopœia in this respect is not achieved. The concealed wisdom of the preface rests undiscovered, while the impressive examples apparently afforded by the text carry a full influence. Accept this contention, and it follows, that if the true meaning of the pharmacopœial doses is to be widely appreciated, and if their unwholesome restraining influence on practice is to be avoided, something more than the general propositions of the preface is necessary. The limitations and qualifications there announced must be carried into the text of the volume, and this in such a fashion that in each individual instance there shall be a clear intimation that the "dose," as stated, is "not authoritatively enjoined," and that the official figures neither limit the judgment of the practitioner nor diminish his responsibility.

"Pharmaceutical Dose."

The harm of the present position arises from the use, without qualification, of the word "dose." It is because they are presented in a fashion so absolute, that the official figures have acquired an authoritative quality to which they have no real title. The suggestion I now offer is that these figures should be deprived of their artificial prestige by the introduction of the limiting term "pharmaceutical"—that, in short, the "doses" of the Pharmacopœia should be printed and quoted as "pharmaceutical doses." Such a phrase would furnish an occasion to the teacher to explain to his pupils its meaning and necessity, and would be a permanent proclamation that neither the Pharmacopœia nor the General Medical Council cultivates the desire either to give lessons in therapeutics or to direct or control the judgment of the prescriber. Further, the term "pharmaceutical dose" can be defended as strictly accurate, for the doses announced in the Pharmacopœia are those which, appearing in a prescription, pharmacists may safely dispense without seeking the special and personal warrant of the physician—they are authoritative doses for members of the pharmaceutical craft or calling. "Pharmaceutical dose" is therefore both correct and appropriate; it indicates the real significance of the official figures, and also prevents them from being regarded as therapeutic lessons. Hence its adoption, without qualifying in any degree such advantages as the existence of a scheme of pharmacopœial doses ensures, would announce openly the freedom of the physician to act on his own judgment.

To take a single example. The dose of tincture of digitalis according to the Pharmacopœia is 5 to 15 minims, and this, in the terms of the preface,

represents "the average range, in ordinary cases." With such a description there is no need to quarrel, but it would be absurd to suggest that the figures as quoted limit the amount of tincture of digitalis which the physician may prescribe. What is wanted is the plain and unambiguous proclamation in the pages of the Pharmacopœia that the pharmacopœial doses have no such limiting effect; and the adoption of the phrase "pharmaceutical dose" would, I suggest, secure this end.

If the necessity for a qualifying term is once allowed, there seems to be none so satisfactory as the one here proposed. "Official dose" would rather aggravate than help the present position, as it suggests authority and command; and "pharmacopœial dose" would have much the same note. Even "average dose" might propose the doubt whether what is formally defined as "average" could be safely exceeded—at least, in any considerable degree. "Pharmaceutical dose" both gets rid of all suggested pressure of official orthodoxy and authority and announces in accurate terms the modest function which it is the purpose of doses named in the national Pharmacopœia to satisfy. It preserves the public advantage, and lessens, or even avoids, the dangers carried by the existing practice.

The Metric System.

A second suggestion which I venture to advance is that the doses stated in the Pharmacopœia be stated in terms of the metric system. The advantages of this system are generally allowed, if not in commercial operations, at least in scientific weighings and measurings, where prescribing and dispensing may fairly be placed. Yet in these activities the metric notation makes little or no advance. Everyone applauds the method, but no one adopts the practice. In spite of the benedictions of congresses and editors, custom and habit maintain their supremacy and the revolution "evaporates in complimentary harangues."

The reason for this stagnation is not far to seek. It is found in the last resort in the practice of presenting the doses in the Pharmacopœia in terms of the imperial notation, and in this notation only. Almost inevitably, therefore, the doses of medicines appear in this guise in lectures and text-books, and are so acquired by students of medicine. Thus, the student necessarily learns to think and speak of doses in terms of the ordinary weights and measures. What he learns as a student he continues as a prescriber, and the dispenser, willingly or unwillingly, follows suit. The sequence is complete. The Pharmacopœia determines the speech of the teacher, text-book, and examiner; these in turn control the student; the prescriber is but the student writ large; and the prescription fixes the habit of the pharmacist. All find the ultimate reason, or excuse, for their adhesion to the imperial notation in the example and custom of the Pharmacopœia.

If, however, the pharmacopœial doses were written in metric terms the entire position would be changed. In lectures and text-books doses expressed in these terms would certainly appear. The student would therefore learn to think of doses in decimal quantities, and teachers and examiners, though doubtless with difficulty and reluctance, would be driven to the same habit. Accustomed in the days of his youth to think in metric terms, the prescriber, when his opportunity comes, will certainly write his prescriptions in this language; and the dispenser will follow, without choice. In short, the key of

the position for those who wish to see the adoption of the metric system in prescribing and dispensing, is the scheme of doses printed in the Pharmacopœia. Until this is captured the demands of preliminary examinations, and the invention of ingenious devices for the ready translation of ordinary weights and measures into metric equivalents, will be exercised in vain. In spite of these methods of pressure and persuasion the prescriber will continue to write in the terms in which he has been trained to think, and he will be trained to think in the imperial notation so long as this is the language of the doses of the Pharmacopœia. It is only by a change in this language that the adoption of the metric system in medicine and pharmacy can be attained; and it is to this essential point that the advocates of the metric system should address themselves.

Use of Metric System in Previous Editions.

Some amount of encouragement in the desired direction can be found in the history of the Pharmacopœia. In the preface to the issue of 1867 the General Medical Council recognised "the advantages that would result from the adoption of one uniform system of weights and measures," but felt unable to employ, "even as an alternative," a system which "as yet is to a great extent unknown in this country"; they did, however, sanction the metric terms to this extent, that authorised test solutions to be used for volumetric estimations were printed both in British weights and measures and in terms of the metric notation. In the 1885 edition no reference was made to the question of weights and measures, but as the preface to the 1867 edition was reprinted in the 1885 issue, the Council presumably agreed generally with the position there defined. In 1898 the alternative employment of metric weights and measures was extended to the main text of the Pharmacopœia, so that since this date it has been permissible to conduct all operations of weighing and measuring required in the manufacture of the official preparations, either in metric weights and measures, or in the weights and measures of the imperial notation. At the same time the alternative in reference to processes of gravimetric and volumetric analysis was abolished, and here the metric system alone appeared. The movement, in short, has been to offer alternative systems, first in the strictly analytical sections of the Pharmacopœia, and next in the manufacturing and pharmaceutical sections, and from this to advance, as in the case of the analytical section, to the metric system standing alone. The doses, however, have remained in terms of the imperial notation only. It would seem to be in harmony with the previous record that these should now be offered in metric terms; and this is the suggestion I here venture to propose.

Doses both in Metric Terms and Imperial Notation.

It is, however, only reasonable to allow that, at first, the metric terms may have to be offered merely as an alternative to the doses as at present stated. This would both follow precedent and would avoid the risk of detaching the Pharmacopœia from the habits and customs of the constituency with which it is concerned. After all, it has to be remembered that the Pharmacopœia is an instrument of education in an indirect sense only. In order that it may serve the public interest it must keep in touch with the existing state of medical practice. An abrupt presentation of the pharmacopœial doses in metric terms only would certainly mean a separation between the language of the

Pharmacopœia and that of the general body of prescribers; and such a separation would be out of harmony with the main purpose of the Pharmacopœia. But to offer the doses in terms both of the metric system and of the imperial notation, especially if the former were given the first rank, would give the decimal plan an opportunity with the prescribers of the future, without creating any division between the Pharmacopœia and the practitioners of the present day. No doubt, even if such a change is made, movement will be slow. But almost certainly there will be some movement, whereas, under existing conditions, the metric system in practical medicine and pharmacy gains many compliments, but makes no progress. It is in vain that advocates of this system address themselves to prescribers whose habits of thought and expression are already fixed; these are beyond hope and must be left in their sins. With the future generation there is some chance. But the Pharmacopœia must lead the way, and, in the fashion here proposed, it can do this without any sacrifice of the object and purpose for which, under the authority of the Legislature, it has been called into existence.

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THE BISMUTH URETERAL CATHETER, COLLAGOL SOLUTION, AND BARIUM SULPHATE SUSPENSION IN THE DIAGNOSIS OF SOME URINARY DISEASES.

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(With Illustrative Plate.)

Catheterisation of the Ureters.

As it is not possible to arrange to have the help of the same assistant every time I catheterise a ureter, I rely entirely upon myself for the performance of this operation. During an experience of six and a half years not a single patient has been infected, and this I attribute (1) to using strong antiseptics for my hands and (2) to the constant use of my aseptic ureteral catheter sheath which I introduced in 1907.

Aseptic ureteral catheterisation sheath.—This sheath (Fig. 1) reduces to a minimum the danger

base and funnelled apex); these are fixed to one another by two thin side rods marked A in the diagram. The screw-cap is a replica of the one on the upper end of the compartment for transmitting the ureteral catheter of the Nitze catheterisation cystoscope. A piece of rubber tubing, 22 inches long and with a bore of one-eighth of an inch, completes the apparatus. The rubber tubing is made to slip over the bulbous bell-mouthed apex of the "cone," and the whole is screwed on to the cystoscope. The ureteral catheter having been introduced into the rubber tubing the catheter is pushed onwards. Owing to the funnel-shaped apex of the metal portion the catheter B readily enters the lumen of the "cone," reappears between the two metal connecting rods, and negotiates the orifice leading into the ureteral compartment of the cystoscope. When the *vis a tergo* has introduced the catheter as far as possible, grasp it between the thumb and index finger of the right hand and push onwards as required. The advantages of this sheath are obvious. It is simplicity itself. The present real dangers from sepsis owing to the catheter touching the operator's face, hair, and being breathed upon are avoided. It is easily sterilised, for both rubber and metal portions will boil. Excepting for the end remote from the tip there is no need to handle the ureteric catheter until it is well inside the cystoscope. The rubber tubing can lie anywhere, over the cystoscopist's shoulder, in between the patient's legs, &c. Without this addition there is a great liability for the catheter to double up at the point of handling when it is being pushed onwards; the opposing thumb and index finger slide up and down the side rods and give the necessary support. It is necessary to use a lubricant for the rubber tubing in order to make the catheter travel more easily; a suitable one is glycerine, and it may be introduced by a sterilised pipette. This sheath can be fitted to any cystoscope.

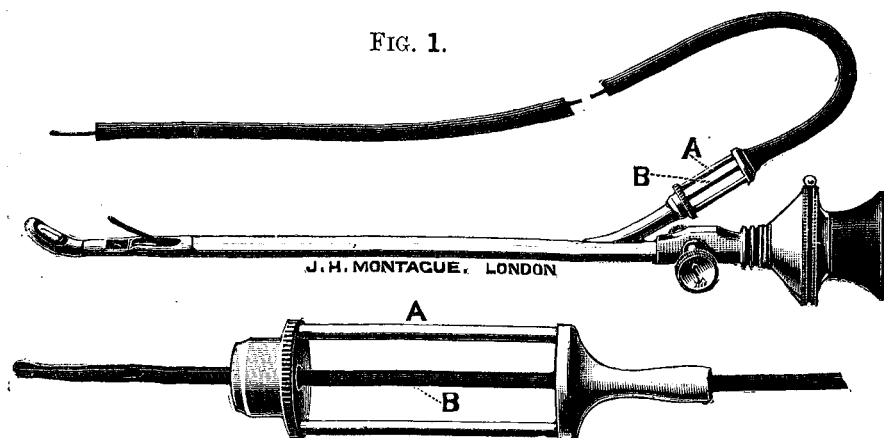
I usually wear rubber gloves during the operation. Just before the introduction of the cystoscope a sterilised cotton glove is put on to the right hand over the rubber glove, as this cannot grasp the slippery lubricated ureteral catheter.

Technique.—I always have the patient in the full supine position on a reasonably firm bed or couch. During the early part of my career I failed in one or two cases to get a catheter into the ureter entirely because the patient was lost in the depths of a feather bed! If possible a general anæsthetic is never employed. Anæsthesia undoubtedly interferes with the renal function, which interference renders it difficult to get an accurate record of the amount of work each kidney is capable of performing. Moreover, I have a wholesome dread of injecting, either by a syringe or by gravity, any fluid into the renal pelvis of a patient who is unconscious through anæsthesia.

To avoid inserting a catheter into the wrong ureter.—Experience has taught me that to insert a catheter into the wrong ureter is a matter of great ease, especially if the patient is restive during the catheterisation. I have made this mistake more than once, and Fig. 2 shows an X ray photograph, with abnormal shadows

in the pelvis, where a bismuth bougie is in the wrong ureter. To avoid a recurrence of this mistake I now always put a blue pencil cross on the skin over Poupart's ligament of the side I wish to

FIG. 1.



Author's aseptic ureteral catheterisation sheath.

of carrying sepsis to the high urinary tract, and it comprises two detachable portions—namely, metal and rubber. The metal one consists of a perforated screw-cap and a conical-shaped portion (with broad