

for four or five years, at an immense expense of money and energy, unless we can equip them at the end of that time with a more exact and uniform armamentarium. Remember you may possess the diagnostic ability of a Flint, an Osler or a Loomis, the therapeutic knowledge of an Eichhorst, Wood or Hare, and yet all this ability is perfectly helpless in the presence of inert drugs and dishonest medical purveyors and manufacturers.

However, declamation is useless. Let us do something and keep at it till we succeed. Much of the present evil is due to the fact that many doctors do not study their texts on *materia medica* as assiduously as when they crammed for their diplomas, but they read trade journals and floating literature on semi-proprietary preparations, whose virtues are extolled by their exploiters. These are little less than common nostrums, and are only combinations of well-known ingredients, one of which is usually some form of alcohol. Let us all stop this, study more faithfully our *materia medica*, the physiologic action of medicines, and their bearing upon pathologic lesions, and in a short time much of this evil will pass away. Only when we ask for better things can we hope to get them.

## STANDARDIZATION OF CRUDE DRUGS AND GALENICAL PREPARATIONS.\*

ALBERT B. LYONS, M.D.

DETROIT, MICH.

Does a given quantity of any medicinal agent produce under similar conditions approximately the same therapeutic or toxic effects? There can be but one answer to this question, and that an affirmative one. Granted that individual susceptibility shows surprisingly wide variations, and that vital reactions are profoundly modified by accidental causes, not always obvious, it remains true that from a certain dose of any potent drug we expect to obtain certain definite results, which we regard necessary for the restoration of our patient to a normal status.

It is true that in adjusting the dose in each particular instance, we take into account the factors of age, sex, general physical condition and known idiosyncrasy on the part of the patient; the very fact that we do this places emphasis on our conviction that a given dose will produce in a normal subject reactions of a definite known kind and degree. In other words, we assume that the medicine we prescribe is uniform in activity.

When that medicine is a definite chemical compound we may have confidence that one grain or one gram of it will under identical conditions produce identical effects, provided, of course, that the remedy itself is exhibited in the same physical condition in each instance—an important proviso sometimes.

A large proportion, however, of the drugs we prescribe are not of definite chemical composition. Such remedies as opium, henbane, nuxvomica, digitalis and ergot consist of crude products of the vegetable kingdom, containing variable proportions of certain active constituents. The most of us find it still necessary to use this class of remedies in our practice. They constitute, indeed, the greater proportion of our *materia medica*, and claim and receive recognition in all the pharmacopeias of the world.

Many of them, it is true, contain definite active constituents which we also employ—in some cases almost

to the exclusion of the drug from which they are derived. We no longer prescribe Peruvian bark as an anti-periodic; quinin is every way better. We use constantly strychnin, atropin, morphin, codein, etc., where, a generation or two ago, we should have had no choice but to prescribe the crude drugs from which these alkaloids are respectively prepared. There are not wanting those who insist that scientific medication requires that we abandon altogether the use of crude drugs, or their galenical preparations, in favor of the active constituents to which is due in each case the therapeutic efficiency of the agent. That is the goal towards which we are tending, but it is a goal as yet far off. For another decade at least we must continue to depend to a large extent upon remedies compounded in Nature's laboratory. The pharmacopeia that must serve us for these ten years must still contain herbs, roots, barks, seeds and fluid extracts, tinctures and similar preparations, and we shall still be compelled to prescribe these if we are to give our patients the benefit of every resource of medication.

In the case of a number of valuable drugs, we have as yet no scientific method of determining beforehand the activity of a given sample. We do not know positively what is the active constituent, nor we have no means of determining with any precision how much of the known active constituent is present. We may judge something of the quality of the drug by its odor or by its taste. Otherwise we must find out what work it will do by actual trial. Must that trial be made upon our patients? Surely not, if it can be done in any other way. True, we may often feel our way in the use of a remedy without prejudice to the welfare of our patient, but the plan is one not to be adopted except in case of necessity. A very much better plan is that of trying the remedy upon some of the lower animals, condemning any which does not produce the effects recognized as those normally produced by the drug in question.

This, however, is a branch of my subject which I barely touch in passing. I wish rather to deal with the class of drugs that contain a definite known active principle, which can be easily isolated and quantitatively determined.

To what extent are drugs of this class found actually to vary in strength? That depends upon the drug. In the case of leaves, herbs and roots, it is common to find one sample two, three, five or even ten times as strong as another. The conditions under which the plant is grown, the season of collection, the length of time it has been kept in stock, the care or want of care that has been taken to guard it from the injurious effects of atmospheric moisture, all have their influence, greater or less, in the case of different drugs. The bark of a tree or shrub, particularly the root bark, shows less variation in strength, and less susceptibility to injury from moisture of the air, and seeds, provided they are properly ripened, are still more uniform and stable in composition; but even in the case of seeds, one sample may often be found to have twice the activity of another.

These facts have been better known generally to pharmacists than to physicians. Manufacturers of fluid extracts began, twenty years ago, to attempt to standardize some of their products by assay. The value of the principle was recognized at once by physicians, and the more progressive manufacturers have continuously improved their assay processes so that their products to-day are substantially uniform in strength, if susceptible of exact assay. Many of the assay processes in use by them are

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confessedly imperfect, yet even an imperfect method of standardization is better than none at all.

Our pharmacopeia is far behind the manufacturing pharmacists in this regard. The only crude drugs whose strength is regulated by assay in the pharmacopeia of 1890 are opium and cinchona bark. Crude opium must contain at least 9 per cent. of morphin; powdered opium not less than 13 per cent. nor more than 15 per cent., while cinchona bark must have not less than 5 per cent. of total alkaloids and at least 2.5 per cent. of quinin. The pharmacopeia provides also for jalap, the requirement that it shall contain at least 12 per cent. of resin, and for scammony that 75 per cent. of it shall be soluble in ether.

Owing to government supervision of importations of opium, the standard in the case of that drug has been reasonably well maintained. It is doubtful whether any particular attention has been paid to the standard for cinchona bark except by some of the manufacturing pharmacists and by a few conscientious retail druggists, unless it has been in some state like Ohio, where pharmacopeial standards have been enforced by local legislation. It is certain that jalap of pharmacopeial standard is hard to obtain anywhere.

The present pharmacopeia does not provide standards for preparations of cinchona, like the fluid extract and tincture, but it does so for the various galenical preparations of opium, except the camphorated tincture, and for those of *nux vomica*. The pharmacopeia of 1900, which will not be issued certainly much before 1903, will enlarge very greatly the list of drugs and galenicals for which standards are prescribed. It is safe to say that belladonna, coca, colchicum, hydrastis, ipecac and stramonium will be included in the new list, together with all their galenical preparations. In the case of *nux vomica*, the assay will determine the amount not of total alkaloids, as at present, but of strychnin, which is now recognized as practically the only active principle of the drug.

Unfortunately, standardization of drugs by physiologic or pharmacologic tests has been ruled out in the instructions given to the present pharmacopeial revision committee. While I recognize the fact that this class of tests necessarily lacks the mathematical exactness which is inseparable from a chemical assay, and, while I admit that there is a certain force in the objection that tests made on the lower animals may be very misleading with regard to the potency of a drug in its action on man, I am sure that standardization based upon these tests, in the case of drugs like these which are liable to be wholly worthless, is better than no standardization at all. If the pharmacologic tests are liable to be misleading, so also are many of the chemical tests. In most cases there are present several alkaloids differing widely in activity. An example of this is seen in *nux vomica*. Heretofore the total content of alkaloid has been taken as a measure of the value of the drug. Conclusions based on such an assay are correct only provided strychnin constitutes a certain fixed percentage of the total alkaloid. In fact, this is approximately true, so that it does not greatly matter whether you state that a given sample of the drug contains 3.2 per cent. of total alkaloid, or that it contains 1.45 per cent. of strychnin, if you remember that about 45 per cent. of the alkaloid is strychnin.

The practical difficulty is in separating accurately strychnin from brucine in the assay process. As yet the problem is not satisfactorily solved, and variations

amounting even to 10 per cent. of the whole amount are liable to occur in the determinations of strychnin made by different analysts. As close an approximation as that we might hope to make in assays by pharmacologic tests.

So in the assay of the mydriatic drugs. We know that in these drugs there exist two isometric alkaloids, hyoscyamin and atropin, besides other bases. We have no method of separating these two alkaloids where the total amount present weighs only a few milligrams—rarely as much as half a grain. We do not yet know accurately how these two alkaloids compare with one another qualitatively or quantitatively in activity, although that subject is now under investigation. It seems to me that it may be possible to judge as to the practical value of a sample of such a drug as belladonna almost as closely by testing the effects it produces on the eye as by a chemical assay. This statement will not seem so strange in the mouth of a chemist, when I say that in some test assays of belladonna leaves made recently by a number of experienced analysts using the same assay processes, results were obtained ranging from 0.24 to 0.41 per cent. of alkaloid, one result indeed falling below 0.20. This is, of course, an extreme case, but when so much is claimed for the exactness of chemical determinations, it is only right that such extreme instances should be taken into consideration.

That our pharmacopeia should so define every article of the official materia medica that prescribers can rely upon obtaining substantially uniform results from the remedies they employ, every one will admit, and this means that the principle of standardization should be adopted wherever it is applicable.

Several practical questions will arise, however, that admit of difference of opinion. The first of these concerns crude drugs. Shall we fix for these a definite, absolute standard, so that if a particular sample of the drug is either below or above that standard it must be rejected? Or shall we simply fix a minimum limit of strength, as we have done hitherto in the case of crude opium? The latter course seems to me to be the only practical one. It will be understood that such drugs are not to be administered in substance, but simply to be employed in the preparation of standardized tinctures.

It may seem at first to some that there is no need in that case of having a standard at all. Not so, for it is impracticable to make standard galenical preparations from drugs containing less than a certain proportion of active principle. The preparation would be greatly overloaded with inert matter.

In the case of drugs that are occasionally prescribed in substance, the pharmacopeia should, as in the case of opium again, provide a standardized powder, adjusted accurately to a fixed definite strength. The ordinary retail pharmacist, of course, could not supply such a powder. Only large manufacturers or dealers could afford the necessary expense and labor involved in making such adjustment of strength, which could only be effected by mixing in the requisite proportions drug below with drug above the required strength, or by the use of a suitable diluent such as sugar of milk.

The problem how to compel the retail druggist to furnish only standard powders in filling the physicians' prescriptions is one that immediately presents itself. Unless physicians understand the matter thoroughly and are in earnest in insisting upon the use only of standardized preparations in filling their prescriptions, the pharmacopeia will remain in this particular a dead letter. Do not understand me to say that physicians themselves will have to do the necessary police work to

secure this end. All that they need do is to post themselves to begin with on the requirements of the new pharmacopeia, and then let the druggists know that they *must have* only the standard drugs and preparations of the pharmacopeia dispensed in filling their prescriptions. The enterprise of manufacturing houses that are keenly competing for the druggists' patronage will do the rest, even without recourse to legal enactments. It is apathy on the part of physicians with regard to matters pertaining to pharmacy that generates in the pharmacist apathy with regard to his professional obligations, which include scrupulous adherence to the requirements of the pharmacopeia.

The practical questions which just now vitally interest the physician are those of the actual standards to be fixed in the new pharmacopeia. The settling of these questions we can not afford to leave wholly in the hands of mere pharmacists. We understand better than they do the importance of conservatism with regard to changes in the character of pharmacopeial preparations. We know very well that more than 50 per cent. of the prescribers in our country—I purposely put the figure low—will not know anything about any changes that may be made in the pharmacopeia of 1900. They will write "Tinct. opii" of "Fl. Ext. nucis vom." as they have been in the habit of writing it, assuming, if they know at all that there is a new pharmacopeia, that there has been no material change in the strength of those preparations. Certainly 25 per cent. of the druggists, to put the figure again a low one, will continue to use the official galenical preparations made in accordance with the pharmacopeia of 1890—or 1870 perhaps—either on the assumption that no material change can have been made in the formulas, or else with the certainty that the physicians who prescribe them expect to get what they have always had under the official names in question.

On the other hand, there is a class of pharmacists to whom changes in pharmacopeial formulas, made with reference to some ideal of uniformity from the pharmacist's standpoint, seem a matter of small consequence. From such men comes the recommendation, for example, that all the tinctures of the new pharmacopeia be made in the proportion of one part of the drug in five fluid parts of the product.

How, then, shall we determine the new standards? We of the pharmacopeial revision committee desire to get an authoritative expression on this question from a representative body of physicians, such as this one. My own view is that the aim should be to make the new standardized tincture as nearly as possible identical in activity with the tincture prepared by the present official method from drug of average good quality.

In the case of tinctures, indeed, I incline to favor the plan that has been adopted in the British pharmacopeia, of making the various tinctures of such strength that the ordinary dose would be in each case a certain quantity. The British pharmacopeia makes two classes of tinctures; in one the ordinary full dose is a teaspoonful, in the other it is 15 minims. This seems to me confusing. If there is to be posological uniformity at all, it ought to be absolute uniformity, otherwise mistakes would be even more liable to occur than were there no pretense of uniformity. As a matter of fact, our present tinctures, with very few exceptions, might be included in one class or the other, of those of the British pharmacopeia. My suggestion has been to eliminate altogether the exceptional tinctures, such as those of aconite and veratrum viride, and in some way distinguish in the

nomenclature the "potent" from the "normal" tinctures, the latter those having a teaspoonful dose.

Except as slight changes in strength may seem to secure more perfectly uniformity of dose in preparations having the same generic name, my view is that the new standards should aim to leave official preparations as nearly as possible of their present strength.

An important case, and one that demands special consideration, is that of the tincture of opium. The strength of this much used tincture has undergone important changes in the past. Thirty years ago it was made of such strength that thirteen minims (more exactly 13.2) represented one grain of opium, supposed to contain 10 per cent. morphin. In the revision of 1880 the strength of the opium used was raised to 12 to 16 per cent., and one grain of this opium was to be contained in about 11 minims (10 grains) of the tincture. In 1890 the strength of the opium was restricted to 13 to 15 per cent. morphin, and now 10.5 minims of the tincture were to represent one grain of opium.

Soon after the pharmacopeia of 1880 was issued some of the prominent manufacturers adopted as a standard for tincture of opium, six grains of morphin (hydrated) to the fluid ounce, which was about the average according to official requirements. The same standard continued to be used by manufacturers under the pharmacopeia of 1890, although very near the minimum requirement. For twenty years, therefore, the tincture of opium has been maintained by the influential manufacturing houses at a uniform fixed standard, and a very large part of the tincture now used in this country is thus standardized.

It is now proposed in the coming revision of the pharmacopeia to make the standard for powdered opium 14 to 14.5 per cent. hydrated morphin and maintain at the same time the ratio of 1 to 10 between powdered opium and the tincture. This means an increase in the strength of tincture of opium amounting to from 5 to 10 per cent. Is this advisable or even justifiable?

Consider in the first place the fact that our tincture of opium is already much stronger than the corresponding preparations of the British or the German pharmacopeias. If any change at all were to be made, it seems to me that it should be in the opposite direction. The present standard of 1.325 per cent. of morphin, or  $7\frac{1}{2}$  grains morphin sulphate (equivalent) to the fluid ounce, is certainly not a convenient one. An increase in strength such as that proposed would enable us to set the standard at the very convenient figure of 8 grains morphin sulphate (equivalent) to the fluid ounce, or one grain to the fluidram. This certainly would facilitate calculations, and possibly this consideration in the minds of some would outweigh the objection that it involves a change of about 6 per cent. in the strength of one of the most important of our medicaments.

Personally, I favor retention for the present at least of the standard to which we have become accustomed, since it is so widely accepted by manufacturing pharmacists. If a change is thought admissible, it should certainly be, as I have already said, in the direction of bringing our pharmacopeia more nearly in accord with those of other countries. A change even in this direction of as much as 10 per cent. in the strength, I do not think would be advisable. It would require fully as great a change as this to meet the German pharmacopeia half way. The discrepancy between our tincture and that used by our neighbors on the north is so great that compromise is quite out of the question. A return to the standard in use previous to 1880 would put us fairly

in harmony with them, but such a change can hardly be advised. It is not greater, indeed, than that made in the revision of 1880, but at that time exact standards had not come into general use.

If we reduce the strength of the tincture from 1.325 to 1.25\* per cent. morphin, it is perhaps all that we can do at present towards bringing our pharmacopeia into agreement with those of other countries. One fluid ounce of the tincture, in that case, would contain the equivalent of very nearly 7 grains of morphin sulphate, 8.4 minims, instead of 8 minims as at present, containing  $\frac{1}{8}$  grain of the morphin salt.

The following table shows the comparative strength of the tinctures in question:

	Grains opium to fl. oz.	Per cent. morphin (hydrated) in opium.	Grains morphin to fl. oz.	Grains morphin sulphate to fl. oz.	Number of minims = $\frac{1}{2}$ gr. morphin sulphate.
U. S. P., 1870 . . .	37.5	10+	3.75+	4.69+	12.9-
U. S. P., 1880 . . .	43.6+	12 to 16	5.23 to 6.97	6.54 to 8.72	9.2 to 6.9
U. S. P., 1890 . . .	45.56	13 to 15	5.92 to 6.83	7.40 to 8.54	8.1 to 7.0
Proposed 1900 . . .	45.56	14 to 14.5	6.38 to 6.61	7.97 to 8.26	7.5 to 7.3
Present standard . . .			6.00	7.50	8.0
Brit. P., 1898 . . .	34.2+	10.6+	3.63+	4.53+	13.2-
German P., 1890 . . .	44.0+	10.6+	4.66+	5.83+	10.3-
Author's suggesti'n . . .			5.69	7.11	8.4
Alternative . . . . .			6.40	8.00	7.5

I have said enough to indicate the nature of the problems which are engaging the attention of the revision committee, and I hope that I have brought home to you as physicians your individual and collective responsibility in relation to the solution of these problems. If I have in any measure succeeded in this, the object of this paper has been accomplished.

#### DISCUSSION.

PROF. C. S. N. HALLBERG, Chicago, said that standardization of crude drugs, if not the burning question, is at least one of those now before the Committee on Revision of the Pharmacopeia. Until the seventh decennial revision, that is to say previous to the revision of 1890, there was no normal standard fixed for any drug, except for opium, for which there was a minimum of 10 per cent. of morphin established. The Pharmacopeia of 1890 required that dry powdered opium should not contain less than 12 nor more than 16 per cent. of morphin; rather a wide range when its therapeutic applications are considered. In the decennium of 1880-90, there had been a great deal of work performed, especially by Dr. Lyons and others, upon alkaloidal assays, and it was thought that the principle of fixation of alkaloidal strength of drugs would be quite largely applied in the revision of 1890. But it was found, by the time the Convention assembled in Washington, that the progress that had been made had not been so great as to warrant the application of this principle to more than three drugs, opium, cinchona and nux vomica, and to the preparations of opium and nux vomica, but not to the preparations of cinchona. Since then, the work has gone on apace, especially among the Germans, but also in this country. In laboratories of Philadelphia, and the University of Michigan at Ann Arbor, particularly, processes have been formulated which would be applicable to drugs for analysis; but whether these processes can be extended to every drug and alkaloid, or active principle of glucosidal character, is another question. He was inclined to believe that as long as studies in the constitution of drugs are still incomplete (the active principle of aconite, for example, has not been accurately determined at the present time, and digitalis and other drugs of like character are still unsettled as to the character or identity of their active constituents), it would be a pretty difficult problem to attempt to fix any definite value to these drugs in the Pharmacopeia. He did not, therefore, believe that this principle of standardization could be extended to many more

drugs than has already been done, or carried out except in a very limited way. He believed that physicians should have some guarantee that the preparations they are using, such as digitalis and ergot, should have at least the minimum of what has been determined to be the active principle. It is due to physicians that this much of the principle of standardization should be preserved; but to lay down definitely the exact proportion of the principal constituents of each drug is a little too much to require. We have not yet reached the stage when that can be done with safety. There are so many men on the Revision Committee who understand the needs of the profession in this respect, that the speaker had no doubt that it will be carefully considered and the principle applied as far as compatible with safety.

F. J. WULLING, Minneapolis, Chairman of Delegates from the American Pharmaceutical Association, expressed his hearty concurrence with what had been stated in the paper and by the preceding speaker. He believed that a representative body like this Section could exert much influence in bringing about a condition of affairs so desirable as the standardization of the crude drugs and preparations of the Pharmacopeia. Druggists have knowledge of the different varieties and varying qualities of drugs in the market, and with the exception of what has been done by the Pharmacopeia, they have no methods of determining the value of these drugs. At the present time, there is no sure way for the physician to determine the value of the drug or preparation which he orders, that is to say, of determining the active constituents, and their proportion so as to base his dosage upon that fact. The speaker agreed with Prof. Hallberg that we have no process of analysis, at present, to determine the active principle of digitalis; unfortunately as soon as one is formulated, someone else immediately shows that it is unreliable and that it varies in its results. While there are many difficulties in the way, still he felt that progress has been made in applying the principle of standardization; and he hoped to see it extended further. For example, he had recently had a specimen of belladonna shown to him, which appeared to be a first-class specimen of the drug. He used it to make a tincture, and found upon dispensing it that physicians reported that they could get no therapeutic effect from it. He tested it upon a dog and obtained no result at all. Further investigation proved that the drug was inert; it contained no atropin. It was a handsome specimen in appearance, but it contained absolutely no active principle. At the present day, the druggist must depend largely upon the physical appearance of drugs unless the tests are given in the Pharmacopeia. The careful pharmacist tests every tincture to see what effect it has and to satisfy himself that there is some virtue in the drugs, not in a very scientific way perhaps, but still it does test their value. We have at present some methods of standardizing crude drugs, and the speaker believed it advisable to adopt these processes in the next revision, and make others as they arise. We can not do all that we desire at once, but we can make a beginning. Dr. Lyons had stated his belief that the ordinary druggist does not have the appliances for carrying out the processes recommended by the Pharmacopeia. The speaker believed that, from personal observation, he would be safe in saying that about 10 per cent. of the pharmacists have the proper appliances to make such analyses, according to the processes recommended in the Pharmacopeia; and he thought that the other 90 per cent. would do well to supply themselves from prominent houses that make standardized preparations. But it does not rest entirely with the pharmacists. Physicians should interest themselves in this subject far more than they do. They should acquaint themselves with the requirements of the Pharmacopeia and insist upon having official preparations. If they do insist, the druggists will only be too glad to supply them. We know that physicians of late years have not confined themselves to the official preparations, but prescribe a number of commercial preparations not in the Pharmacopeia. Possibly, this may be largely due to the greater convenience of ready-made pharmaceuticals. Some years ago, he had taken occasion to interview a number of physicians to solicit their

\* 1.25 grams in 100 c.c. of the tincture.

support for the "National Formulary" and he was quite successful in obtaining their help. Physicians told him that they wished their drugs to be reliable, and if they specified the manufacturer, it was in order to obtain a good article; if they felt assured that they could always get a reliable tincture or fluid extract, they would prescribe them in preference to the proprietary preparations. Attention of physicians should be drawn to the "National Formulary" of the American Pharmaceutical Association, because it contains formulas especially prepared to relieve physicians of the necessity of prescribing secret proprietary preparations which are not compatible with the dignity of physicians and which they prefer not to use. Some physicians hesitate about writing extemporaneous prescriptions on account of incompatibility and of making unpleasant combinations. They find it more convenient to order pills already made, and save themselves trouble. The speaker urged that the members of the Section use their influence to have the medical colleges of this country introduce the Pharmacopeia as a text-book. As it is, many physicians have never seen a copy of the Pharmacopeia and do not know it from the Dispensatory. He thought that most of our colleges pay very little attention to pharmacy, which is a great mistake. If practical pharmacy and materia medica were made more prominent in the curriculum of the medical colleges, he thought that the new graduate would be better qualified to practice his profession. He had met physicians who had never seen iodic of potassium! One physician told him that he did not know whether paregoric contained any opium or not! Where there is power, as there is in this Association, if it be used judiciously, much can be accomplished. With regard to standardization, he thought that it should be accomplished as far as possible at once or without unnecessary delay.

DR. A. M. WILSON, Kansas City, said that some years ago a class of men about to graduate from a medical school, about fifty in number, came to him for private instruction, and he found that not one of them could tell the difference between a tincture and a fluid extract. Although not practicing pharmacy for several years, he still has a private laboratory and is much interested as a graduate in pharmacy in the subject under discussion. We all know that a prescription, say for tincture of belladonna, taken to a half dozen different druggists would very probably bring back a different preparation from each one. He was, therefore, in favor of standardization. He advocated a better understanding between physicians and druggists, and thought that it would be better if the medical graduate could be made more of a druggist than he is at present. While the foundation of medicine is diagnosis and pathology, the superstructure is pharmacology and therapeutics. The text-books, however, are devoted almost entirely to pathology and say very little about the administration of drugs. He was certain that no satisfactory understanding can be reached until the physician knows as much as the druggist. At present, the Pharmacopeia is a sealed book to the physician and the average student coming out from a medical school is not competent to prescribe drugs, and therefore may easily be led off into Eddyism or other vagary. Out of a class of 122 that went out from a Kansas City medical school, there was only a very few who knew anything about the Pharmacopeia or the preparation of drugs. We should realize the tremendous responsibility of this subject and endeavor to have pharmacology more thoroughly taught. He believed in the use of standard drugs upon the standard human being, and he hoped that the effort to secure uniformity would succeed for the happiness of posterity and reputation of the medical profession.

DR. W. L. DICKERSON, St. Louis, Mo., said that with reference to the criticism that medical students go out without any knowledge of materia medica, he thought that it could not be any different under the present arrangement of studies. The student taking a four-years' course is expected to complete his studies of materia medica and pharmacy in the first year. He said that it would be better if these studies were made continuous throughout the four-years' course. He was glad that the revision of the Pharmacopeia was in the hands

of authorities who are giving due attention to the subject of standardization. The strength and dosage of tinctures are very variable and he thought that there could be no uniformity as long as the strength of tinctures varied all the way from 5 to 35 per cent.

DR. N. S. DAVIS, JR. (Chairman), said that he had for a number of years given much thought to the subject and he approved of the adoption of standardization of drugs and preparations just as soon and as far as possible. At present, however, the field in which it can be done with safety is very restricted. As a member of the Revision Committee, he had endeavored to carry out one plan, which he had always desired, and that was to make the Pharmacopeia more useful to medical men. He thought that physicians should be interested in it just as much as druggists are; it is the common standard for the two professions. It has not, hitherto, been arranged for physicians, but for druggists, and is not especially interesting to medical men, although it might be made a useful work in reference for both. With regard to instruction in medical schools, medical students in their first year acquire a certain amount of information with regard to materia medica and pharmacy, just as they do of physiology, information which they afterwards make use of during the remainder of their course at college. It can not be said with propriety that these studies are discontinued at the end of the first year, because they constantly make use of them throughout the entire four-years' course. He thought it very necessary in order to obtain definite results from drugs, to use products which are standardized, in preference to allowing the prescriptions to be filled with unreliable preparations which would not yield uniform results. Returning to the Pharmacopeia, he said that, in his opinion, all the new remedies should be placed therein, in order that physicians might be able to consult the Pharmacopeia for the latest authoritative information about drugs. It should not be a volume of standards, nor attempt to say with authority what drugs should be used, but a reference book. It should, therefore, contain all the newer drugs, whether they had been tested or not; these possibly might be put in an appendix, but all the new ones as well as the older preparations should be contained in it; the latter because they are still used by some physicians. As regards teaching of materia medica in the leading medical schools at the present time, laboratory courses are given in pharmacy, where the students are made familiar with the appearance of crude drugs, their chemical tests, and how to make the preparations. This course is supplemented by one on the physiologic effects of drugs. As students so taught come out and enter the profession, he felt sure that they will be far better informed as to the effects of drugs than those who graduated some years ago, of the class to which the last speaker had referred. It can not be said that these subjects do not receive sufficient consideration in our principal medical schools.

## THE PROPER MANAGEMENT OF THE TUBERCULOUS LUNG.\*

NORMAN BRIDGE, A.M., M.D.

LOS ANGELES, CAL.

How to manage a lung infected with tuberculosis so as to give it the best possible chance of recovery is a great desideratum, and only second in importance to the general management of the system as a whole.

A better understanding of the normal process of recovery of tuberculosis and of diseased lung tissue in general, makes it necessary for us to revise our notions of the proper hygiene and management of the tuberculous lung. It is necessary that we should recast our theories of cure and change our procedures with the lungs themselves. We must learn new ways, or rather

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