THE U. S. PHARMACOPŒIA THE NATIONAL SAFEGUARD AGAINST ADULTERATION.

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The history and development of the U. S. Pharmacopœia is an interesting subject and is well worth a study by every physician, pharmacist, and chemist. The movement inaugurated by Dr. Lyman Spaulding, of New York City, in 1817, resulted in the publication of the first edition of the Pharmacopœia of the United States. Prior to that time there had been several attempts to prepare a pharmacopœia suited to the needs of certain sections of the country, and as an outcome of these early efforts there had appeared several works accepted locally as authorities. Even in the time of the Revolutionary War the need of such an authority was recognized, and the very first attempt of which we have an authentic record was evidenced in the small pharmacopœia published in Philadelphia in 1778 for use in the American army.

With the growth of each nation there is the corresponding increase of the medical practices, and the necessity for uniformity of medicines soon becomes apparent as one of the problems of national progress. This requires the preparation of an authorized book of standards and formulas, a national pharmacopœia. The United States has been no exception to this law of national progress, and the need for uniformity in the remedies directed by physicians was the inciting cause that led to the production of the United States Pharmacopœia.

Many physicians have not been content to restrict their practice to the prescribing of pharmacopœial drugs and official preparations, but have sought and used a much wider range of remedies. Hence there has arisen in this country the need for still another authorized book of formulas for non-pharmacopœial preparations that are frequently prescribed. That need has been met by the publication of the National Formulary, which has attained the authoritative position of being recognized in the Food and Drugs Act as the companion of the United States Pharmacopœia and equally a legal authority.

The pharmacopœia, as originally prepared, was very little more than a book of formulas approved by the medical profession and voluntarily accepted as the authority by doctors and druggists. Its preparation and publication were without governmental authorization, and for years it was not accorded recognition as a legal standard and authority.

The system of revision adopted for the U. S. Pharmacopœia is distinctly American, and to its very democracy must be attributed the success that has attended the plan. Without any attempt at laudation, we are justified in claiming that the recent revisions of our pharmacopœia compare very favorably with the most advanced and scientific revisions of other national pharmacopœias. It is to its honor and to the credit of American methods that it has gained the distinction of being designated as " the autocrat of the pharmacopœias."

With each revision there has been a marked improvement, and a gradual change in the character of the work can be noted. The pharmacopœia has become less and less simply a book of formulas and has become more and more a book of standards prepared with a definite purpose in view.

It was early seen that uniformity in preparations could not be secured unless the various ingredients entering into the formulas were of uniform quality. This necessitated the formulating of proper standards for every article so used, even

though many of these ingredients, such as the common solvents, were not, *per se,* used as medicinal substances.

In the editions prior to the revision of 1880 the drugs of animal and vegetable origin were treated in a rather primitive style, a simple definition in most cases serving as the entire standard. As examples of this earlier form of standard making, the following quotations from the Pharmacopœia of 1870 are cited: "Aconiti Radix. Aconite Root. The root of Aconitum Napellus." "Belladonnæ Folia. Belladonna Leaves. The leaves of Atropa Belladonna." "Coriandrum. Coriander. The fruit of Coriandrum sativum." "Scilla. Squill. The bulb of Scilla maritima." Even elementary descriptions of the macroscopic characters were omitted, and means of determining purity and freedom from sophistication or adulteration were ignored. In a very few cases botanical authorities were given, and in a few exceptions the references for such statements were mentioned. As examples: "Colocynthidis. Colocynth. The fruit, deprived of its rind, of Citrullus Colocynthis (Royle Mat. Med.)." "Senna. Senna. The leaflets of Cassia acutifolia (Delile), of Cassia obovata (DeCandolle), and of Cassia elongata (Lemaire, Journ. de Pharm., vii, 345)." "Santonica. Santonica. Syn. Levant Wormseed. The unexpanded flowers of Artemisia Cina (Wilkomm, Botanische Zeitung, 1872, No. 9)." In the latter is noted the presence of a synonym, which was the exception and not the rule of that revision.

The treatment of chemical substances in these earlier revisions was somewhat better than that of the organic drugs. As late as the revision of 1870 chemical formulas were not given, but the definitions of the chemicals were commonly accompanied by short descriptions and simple qualitative tests for identification and purity.

The revision of 1880 marked a great advance in the character of the book and a distinct epoch in pharmacopœial revision. In that revision the monographs indicate a modern, scientific treatment of the subjects. We are indebted to the convention of that year for the "General Principles to be Followed in Revising the Pharmacopœia." To the successful carrying out of these principles can be attributed the advances then made and which became the foundation for the substantial progress of the more recent revisions, and, moreover, they made possible the acceptance of the United States Pharmacopœia as the leading legal authority for the standards of drugs under the Food and Drugs Act.

Among the important improvements inaugurated in that revision may be mentioned the descriptions of crude drugs; the giving of the botanical name of the drug-yielding plant, accompanied by the name of the author, and likewise the natural order of the plant; the addition of chemical formulas for all chemicals of definite composition; more complete descriptions of chemicals, with tests for identity and purity and in many cases quantitative methods for their assay; the recognition of the principle of assaying of alkaloidal drugs with definite processes for the assay of opium and cinchona.

In the subsequent editions of 1890 and 1900 there were established as additional innovations the purity rubric in chemicals, setting forth in the definitions the degree of purity required; improved methods of assay of chemicals, drugs, and galenicals; adoption of many of the international standards; the extension of the alkaloidal assays wherever possible; and the improved descriptions of vegetable drugs and powders.

In the forthcoming U. S. P. IX, now on press, the purity rubric has been extended to vegetable drugs, and in most cases this rubric will set forth the percentage and character of allowable admixtures. The treatment of organic

drugs will show a notable improvement. Here the descriptions have been extended to the microscopical characteristics of the structure and of the powder, likewise with measurements of the structural elements. The methods of assay have been revised and extended, and the limitation of the ash content has not been overlooked. The assaying of chemicals has been extended by giving the most advanced methods, even electrolytic. For certain drugs where chemical assaying is not possible biologic assays have been proposed. Diagnostic reagents and clinical tests are provided for.

The purpose of this necessarily cursory review is to trace the evolution of the pharmacopœia from a book of formulas to that of a book of standards fulfilling the important function of serving as the legal authority for drugs and safeguarding the entire country against adulteration.

One of the earliest acts of Congress, if not the first, recognizing the pharmacopœia as a legal authority, was the act to prevent the importation of adulterated and spurious drugs, approved June 26, 1848. This law named the United States Pharmacopœia first in the list of authorities for " testing the strength and purity " of imported drugs. That law has not been repealed, and, despite the fact that the Federal Food and Drugs Act has superseded many of its important paragraphs, it remains the authority under which the Treasury Department still issues its regulations regarding imported drugs.

When the Food and Drugs Act of June 30, 1906, specified the United States Pharmacopœia as its principal standard for the strength, quality, and purity of drugs, there was some doubt as to whether the U. S. P. VIII, which had not been prepared with the main purpose of serving as a legal standard, would meet the requirements of the law. This responsibility has now been placed upon the Pharmacopœia for nearly ten years, and it appears to have satisfactorily served the purpose. The U. S. P. IX has been prepared with the full knowledge of its official standing as the legal standard, and a comparison of its monographs with the monographs of the previous revisions will demonstrate that throughout every page its character as a law book has received consideration.

It is to be noted that when the Food and Drugs Act was passed no book of standards for the foods was available, and so no standard work was named for determining the strength, quality, and purity of foods. The Department of Agriculture has been attempting to supply this deficiency through decisions, thus arbitrarily fixing standards for certain food products. The act does not specify any standards for foods, nor does it delegate to any department or body the authority to prepare legal standards for these, and so it becomes a grave question if standards fixed by department proclamations are valid or can be enforced as legal standards under the law.

On the other hand, the United States Pharmacopœia, from cover to cover, is a law book for the quality of drugs. Its standards reflect the best thought and ability of the times. There is scarcely any question relating to the quality of the commonly used drug products which cannot be answered, either directly or indirectly, through the information contained in this volume. As a storehouse of useful information it is invaluable to those who would manufacture and deal in medicines. As a rule, its tests are within the means and ability of the average pharmacist. A few of the official tests may require special apparatus obtainable only in laboratories of the larger manufacturers or expert chemists, but there are very few drugs, chemicals, or preparations the purity of which cannot be quickly determined by the druggist with the apparatus and test solutions which should be on hand in every pharmacy and laboratory.

The responsibility for complying with the requirements of the Pharmacopœia is placed upon the individual who assumes to compound and dispense drugs. It is the plain duty of every pharmacist to support absolutely the standards of the Pharmacopœia and to respect and follow the principles and precepts of this volume. It is unfortunate that some of those who are engaged in the drug business have not yet learned of the adequacy of the United States Pharmacopœia and have failed to study its requirements.

The druggist cannot be blamed for following the usual law of trade and seeking to obtain his supplies in the cheapest markets, especially under the conditions prevailing at the present time, when prices are largely speculative. He is, however, negligent if he purchases from irresponsible sources without a guarantee and without himself testing such purchases.

Many of the adulterations that have been reported as practised through such unreliable sources of supply as itinerant pedlers could have been detected by the simplest test laid down in the Pharmacopœia. It is difficult to understand how any druggist could have been deceived by such gross adulteration as the sophistication of boric acid for acetphenetidin and cream of tartar for aspirin.

POSSIBILITIES FOR DISPLACING UNOBTAINABLE MATERIA MEDICA.—THE U. S. PHARMACOPŒIA IX.*

BY S. SOLIS COHEN, M.D.

Professor Solis Cohen contends that the problem of finding a drug that will successfully displace one now unobtainable, or practically so, is not so simple as the mere substitution of sodium for potassium as a basis for iodides, bromides, acetates, etc. As a matter of fact, sodium is preferable in most cases, though there are a few in which the potassium is needed to preserve the ionic balance, or for other reasons. But one cannot get the needed effect of a hypodermic injection of quinine in malaria or pneumonia, for example, from tincture of cinchona, nor the needed strychnine effect from nux vomica. It is just because there is a difference between the medicinal effects of galenicals and the medicinal effects of alkaloids, each having its proper sphere, that the consensus of medical opinion frowns upon the erection of alkaloidal therapy into a cult. Of course, there are some cases in which belladonna may be made to serve the purpose of atropine, and doubtless physicians will bear in mind this suggestion. So far as the coal-tar products are

* The paper by Mr. Beringer and the remarks by Dr. S. Solis Cohen have a particular interest at this time on account of the advent of U. S. Pharmacopœia IX. These were presented at a joint meeting of the Philadelphia Branch, American Pharmaceutical Association, and the Philadelphia County Medical Society. The purpose of the joint meeting was largely to consider the present drug situation, causes, means of relieving, etc. There were a number of other most excellent papers and addresses, which have appeared in part. Dr. R. P. Fischelis spoke along lines embodied in his paper published in April, 1916, JOURNAL, p. 411. Dr. Franklin M. Apple reviewed the market conditions of the past two years. Dr. John R. Minehart referred to many native drugs that are available. Prof. C. H. LaWall spoke of the large commercial consumption of drugs and chemicals in manufacturing as causes of scarcity, and the need for revision of our patent laws. Dr. Horatio C. Wood emphasized the latter statement, and indicated that the difficulties arising through unobtainable drugs were not nearly so serious as some contend; that some, at least, could be advantageously displaced.