

## THE PHARMACOGNOSY LABORATORY, ITS ACTIVITIES AND AIMS.\*

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This paper has been prepared in the hope that other workers, engaged in pharmaceutical and related research, may be induced to prepare similar statements, sufficiently detailed to indicate the nature of their studies, though the work may be still in progress. Thus we could hope to secure a census of pharmaceutical research in this country.

Such a census, it is believed, would largely prevent unnecessary duplication of work, and bring about increased coöperation; it would demonstrate the extended scientific activities of American pharmacists, pharmaceutical-botanists—chemists, physiologists—and the broad fields covered by their endeavor; it would suggest and stimulate new research.

The activities of the Pharmacognosy Laboratory may well be discussed under 2 headings: "Crude Drug Control" and "Pharmacognosy Investigations." This division, however, is rather arbitrary, since it is and has been our aim to carry on the one, drug inspection, with a research spirit, and the other, drug or plant investigation, with a practical view point.

## I.

## CRUDE DRUG CONTROL.

The work of the Pharmacognosy Laboratory in connection with the enforcement of the Food and Drugs Act consists in the main of examination of samples of appealed shipments, and the identification of unknown or mislabeled drug products which are sent in by inspectors, supervising interstate trade or importations. Some results of our activities along this line, throwing also a light on the nature of the work and the difficulties sometimes encountered, were presented at the last (1918) meeting of this Association and are published in the June number of the JOURNAL.<sup>1</sup> In connection with crude drug products which have come recently to our attention and which are as yet little known to the general trade, incorrect or misleading names were used. A note has, therefore, been prepared, which, after pointing out the existing varied bases for common names, urges greater care in the adoption and use of a common name and gives suggestions how the improvement may be brought about.<sup>2</sup>

*Domestic Trade.*—A preliminary survey was made of the crude drug industry of the Southern Appalachian Region, covering part of the mountains of West Virginia and North Carolina, in order to secure information regarding domestic trade practices. A paper relating the observations made on this trip is published in this JOURNAL.<sup>3</sup> A considerable number of different native drugs, largely of an unofficial nature, were also secured for reference and investigational purposes. A paper reporting the analytical data with regard to total and acid-insoluble ash, and total and volatile ether extract found in the specimens, numbering over 300, has been prepared for publication.<sup>4</sup> A note on "Commercial Hydrastis," discussing briefly the analytical results obtained in the examination of domestic samples, both in the whole and powdered state has also been prepared.<sup>5</sup> The major part of the samples, and especially those in ground state, were found to contain excessive amounts of sand and earthy material. Another note discussing the charac-

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teristics of Man-root (*Ipomoea pandurata*), a possible substitute of Jalap-, Scammony- or Orizaba-resin, and two other convolvulaceous resins is in preparation.<sup>6</sup> A product called "linen seed" and submitted for identification was found to be *Hibiscus bifurcatus*. Though related to cotton seed (*Gossypium*) and containing like this appreciable amounts of a fatty oil, the phenolic and poisonous substance—gossypol—present in cotton seed, was absent in Hibiscus seed.

*Import Trade.*—Among adulterants found in import trade those of *Aethusa cynapium* for Conium leaves,<sup>7</sup> and *Santolina chamaecyparissus* for *Matricaria chamomilla*<sup>8</sup> were recently reported. Further should be mentioned the substitution in part of the seeds of *Jatropha curcas*, occurring in an imported shipment of castor beans, and the adulteration of "mustard" consisting of 85 percent Indian Tori (related to European rape) and only 15 percent of genuine Indian mustard, *Brassica juncea*. A root, probably of an unofficial smilax species, was found to be substituted for sarsaparilla; another, as yet not identified monocotyledonous root composed part of a shipment, labeled "Black Hellebore" (*Helleborus niger*), the remainder being genuine hellebore. Arnica Flowers were substituted by flowers of *Heterotheca inuloides* and rhubarb again by rhaponticum root. Service and Regulatory Announcements discussing the main differentiating characteristics of the adulterants in comparison with the genuine products, have been prepared, but not as yet published. Regarding previous announcements see (9).

*Elimination of Inert and Objectionable Material in Crude Drugs and Spices.*—General information has been obtained regarding the cleaning of different types of crude drugs and spices by washing, flotation, sifting, blowing, scraping and other methods based on difference of weight, size, shape or consistency. Specific information has been collected in the case of wormy or moldy nutmegs, areca nuts, ginger, orris root, and mustard seed.

*Extension of Standardization of Purity for Drugs.*—A large number of ash analyses of crude drugs have been made, with especial reference to the value of the acid-insoluble ash determination as an index of cleanliness. A paper calling attention to the value of such standards has been prepared and will be published in your journal.(10)

*Value of Volume Weight Determinations.*—Data have been collected to demonstrate the value of a more extended use of volume weight determination in the analysis of crude drugs and spices. The weight of a certain volume is extensively used in grain standardization and to some degree by the trade in the judgment of pepper. Recent findings with regard to areca nuts, nutmegs, fennel, ergot, mustard, etc., suggest that the weight of 100–500–1000 ccm. of crude drugs, as far as they are of fairly uniform size, such as seeds and fruits, or consist of powder, such as lycopodium or kamala, can often be used for an immediate indication of inferiority, due to worm infection, moldiness, immaturity, partial extraction, substitution, presence of sand or other foreign matter, etc.

*Pharmacopoeial Work.*—The collection of data dealing with the further improvement of the U. S. Pharmacopoeia has been continued. The nomenclature of the Pharmacopoeia as well as that of the National Formulary has been studied, especially with regard to the Latin names, English names, and synonyms for crude drugs officially recognized. As a result of this study it appears that further im-

provements tending to greater uniformity and clearness are desirable. The adoption, by the Pharmacopoeia and other standard works, of acid-insoluble ash standards and the change or adoption of certain standards for total ash has been urged in a note, already referred to.

#### THE PREVENTION OF WASTE AND UTILIZATION OF WASTE CRUDE DRUG PRODUCTS.

*Cinchona*.—In recent years the world has been virtually dependent on Java for its supplies of cinchona bark (or quinine). This has, especially under the recent war emergency, resulted in extreme scarcity and greatly increased prices. Considerable supplies of cinchona bark are still available in South America, though the trees are mostly wild. A number of specimens from these sources have shown marked variation in alkaloidal content; further samples of authentic bark have been obtained from Ecuador for pharmacognostical and chemical study.

*Ipecac*.—Ipecac root, as frequently imported, contains a considerable amount of so-called "stems," of which the present U. S. Pharmacopoeia only permits 5 percent at the most to be present in the drug. Collective evidence has been obtained that this part referred to as "stem" consists largely of the underground part of the axis, more properly referred to as rhizome; the young and still smooth roots at times may also be considered as stem, since they resemble the rhizome rather closely in appearance. These parts, evidently by mistake, referred to as "stem" were found to contain appreciable quantities of ether soluble alkaloids. It appears quite probable that the problem connected with the utilization of this hitherto rejected but valuable part of the Ipecac plant can be solved by the modification of the definition for Ipecac as "the dried roots and rhizome. . . ." It is contemplated to publish a note on this subject.

*Areca Nuts*.—The material of areca nuts imported within recent years has not been of high quality. A sample, badly infected by worms and molds, was separated into sound, distinctly moldy, and wormy nuts. The three separations were analyzed for arecoline, according to the method of the Swiss Pharmacopoeia (1907), except that iodeosin was used instead of haematoxylin as an indicator, in conformity with a suggestion given in recent literature by Hebeisen. In order to ascertain whether all available arecoline had been extracted during the procedure suggested in the method, samples of each grade were extracted in soxhlets, and the extract treated as before.

#### RESULTS.

	Extraction according to Method in Swiss Pharmacopoeia.	Complete Soxhlet extraction.
Sound nuts. . . . .	0.39-0.40% arecoline	0.37% arecoline
Distinctly moldy. . . . .	0.32-0.34% "	0.32% "
Very wormy. . . . .	0.36-0.38% "	0.34% "

Analysts: A. Viehoveer and E. E. Stanford.

These results indicate that the alkaloidal content is highest in sound nuts, but that it is not very appreciably affected by worms and mold. Molds had a stronger effect than the worms. No grade of this sample attained the standard of 0.5 percent alkaloids, suggested by the Swiss Pharmacopoeia. Recently further samples of moldy and wormy areca nuts have been secured, and arrangements have been made with the Bureau of Animal Industry to submit them to pharmacological tests.

*American Ergot.*—The utilization of American ergot, obtained from rye screenings, has been under consideration in coöperation with the Central Inspection District located in Chicago. The products examined were in excellent condition and were found to be quite active physiologically; difficulties, however, are encountered in isolating the ergot on an efficient commercial scale from the screenings.

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## II.

## PHARMACOGNOSY INVESTIGATIONS.

*Studies in Brassicas.*—Growing experiments and chemical studies were carried out with several mustards and mustard substitutes.(1) The seeds were obtained from different parts of the world, and especially from Japan, China and India. They were planted in Arlington, Va., Yarrow, Md., and Urbana, Ill. The plants grew well in all three places, but especially vigorously in the rich soil of Illinois. The amount of seeds obtained per plant, and the pungency of the seeds, were great. In a number of instances sufficient material from individual plants was secured for the determination of the latitude in the amount of glucoside present. The amount of volatile oil found reached in certain cases as high as or even higher than any reported in literature. While the growing experiments were only carried out on a small scale, the results suggest that the commercial cultivation of all the different varieties, and especially the Japanese and white mustard, should be successful.

Preliminary experiments concerning the distribution of the glucoside or glucosides within the plant indicate that the fresh tissue of the different parts of the entire plant, roots, stems, leaves and fruitpods, yield an oil with characters similar to that obtained from the seeds. The enzyme, effecting the hydrolysis of the glucoside, appears present in the green plant in a highly active form, since the glucoside in the growing tissue is far more readily hydrolyzed than in the seeds.

A monograph on Chinese Colza is being published as a Department Bulletin.(2) It discusses the chemical, anatomical data of the seed, and the physiological data of the seed and seed constituents, and the morphological characters of the plant.