

and endangers the quality of the finished product. With satisfactory offers for their crop in hand some growers have left fields of fine sage unharvested on account of the anticipated difficulty in marketing.

In comparison with the quantity of insect flowers imported from Japan domestic production of these flowers in 1921 was entirely negligible. Small quantities produced experimentally in South Carolina and Wisconsin have been found the equal of Japanese flowers in effectiveness of action on certain insects. Upon analysis, however, the content of insoluble ash of these domestic flowers was found to run considerably above the standard limit of 2 per cent.; consequently dealers refused to purchase them. Should this high content of insoluble ash prove to be a constant characteristic of insect flowers grown in the eastern part of the United States it is unlikely that much interest will develop in their commercial cultivation.

Notwithstanding the unfavorable outlook for commercial drug growing occasioned in 1921 by the disparity between production costs and market returns, stocks of propagating material were maintained by many growers for the purpose of again extending their plantings as soon as conditions become favorable.

No statement regarding drug-plant growing in this country should omit some reference at least to the drug gardens maintained in connection with various schools of pharmacy. In 1921 the growing of drug plants was a feature of the educational work at twenty-six different institutions and at several others plans were being made to establish drug gardens as soon as facilities were available.

Insufficient funds and changes in personnel have restricted the work of some gardens but others have been more fortunate. One of these gardens has won the appreciation and support of the Pharmaceutical Association in the state where it is located and through a section devoted to poisonous plants has developed among the graduate veterinarians in the state a broader interest in the relation of these plants to animal health; at another garden plans are well developed for an important biochemical study of the mints which will involve research in the fields of both genetics and plant chemistry; still another garden has been materially extended through the generosity of a prominent manufacturer of pharmaceuticals who appreciates the increased opportunity which the garden affords for research work on drug plants.

The development of special fields of activity by different gardens is a gratifying sign of progress and clearly indicates the undesirability of a set formula of procedure to be followed by all. The specialization made necessary by the limitations peculiar to each garden will bring about not only an extension of the scope of the work on drug plants but also an increased appreciation of the aim and object of pharmaceutical education.

A REVIEW OF THE LITERATURE IN PHARMACEUTICAL BOTANY
AND PHARMACOGNOSY FOR 1921-1922 (AUGUST 1, 1921-
AUGUST 1, 1922).*

BY HEBER W. YOUNGKEN.

I am deeply gratified by the large number of excellent papers published during the last year in the field of pharmacognosy and pharmaceutical botany. Scien-

* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

tists, the world over, have attacked with enthusiasm and zeal the perplexing pharmacognostic problems facing them, and, in coöperation with our leading scientific journals, have produced many valuable papers. Although it is not possible in a review of limited nature like this one to mention all those deserving of credit, I must take this opportunity of praising the admirable work of L. Rosenthaler, L. Hecke, T. E. Wallis, G. E. Brunner, A. Viehoever, E. M. De Calvino, E. M. Holmes and A. Stoll. For the purpose of convenience alone, I am going to divide our field into the following sections and mention some of the prominent work accomplished under each heading: (1) morphology, (2) drug cultivation, (3) microanalytic and microchemic methods, (4) drug adulteration and substitution, (5) plant chemistry, (6) ash determination, and (7) history.

With morphology as the first topic under consideration, I mention the paper, "The Structure of *Cocculus indicus*," by T. E. Wallis, in which there is a detailed, illustrated description of the anatomy of the commercial fruit. Next, I mention the work of the Department of Pharmacognosy of the Philadelphia College of Pharmacy and Science upon the little-described *Muirapuama* which has been employed in Brazil and France for treatment of various forms of nervous disorders. "Domestic and Imported *Veratrum* (Hellebore)," by A. Viehoever, G. L. Keenan and J. F. Clevenger, is an interesting study of the rhizomes and roots of *Veratrum viride* and the imported *Veratrum album* in which means are pointed out for the differentiation of the rhizomes and roots of each, as well as for another native form, *Veratrum californicum*. The paper by E. M. De Calvino appearing in a recent number of *Revista Medica Cubana* entitled "Los Pelos Urentes de la Pica Pica" (The Stinging Hairs of *Mucuna pruriens*)" is also worthy of notice. In this paper, the author discusses in detail the morphology of the entire plant, the histological features of the hairs, their chemical constituents, therapeutic properties, the chemical constituents of the seeds, and treatment of the itch produced by the hairs. She also shows that the hairs of a similar-looking fruit, *Stizolobium capitatum*, differ from those of *Mucuna pruriens* by the absence of hooks and mineral incrustations.

A number of articles have appeared on drug cultivation. Of these, I deem the following as most important: "Cultivation of Buchu," by J. W. Mathews; "Cultivation of Ipecac," by P. van der Wielen, "Cultivation of Ergot," by L. Hecke; "The Influence of Inhibiting Flowering on the Formation of Alkaloids in the *Daturas*," by A. F. Sievers, and "Henbane Cultivation," by E. M. Holmes. The last-named writer shows that only the largest early-matured seeds of henbane should be retained and planted, after being allowed to remain in water over night, in soil rich in magnesia. It appears to me that the subject of drug cultivation is one of the most fertile fields for experiment, and one that we cannot afford to overlook or slight. The more scientific our knowledge, the greater our yield, and the cheaper and more perfect our product.

With respect to microanalysis and microchemic methods, the paper by T. E. Wallis on "Analytic Microscopy" is among the most important. In this, the writer gives the methods of preparation of crude fiber for counting and also certain counting methods illustrated by the *Lycopodium* spore and starch procedure.

Considerable work has been done on drug adulteration and substitution. The following titles illustrate the nature of this research: "Adulterated Marjoram," by A. Nestler; "Sarsaparilla Substitute," by O. Frey; "Detecting *Tragacanth* in

Powdered Acacia," by Triveson; "Convallaria Flowers as Chamomile Substitute," by A. Viehoever and J. F. Clevenger; "Dangerous Adulterants of Poppy Seed," by F. Kryz; "German Substitutes for Senega and Ipecac," by C. Grimme; and "Fake Saffron," by A. Viehoever and J. F. Clevenger. I would fail were I not to mention here the valuable papers of O. A. Farwell on "Adulterated Pellytory," "Adulterated Althæa," and "Scoparius Substitute."

By far, the trend of research of the past year has been along the lines of plant chemistry. Many papers have been published of which time only permits me to give brief mention to examples. Those deserving especial attention are "Constituents of Viburnum Opulus Fruit," by R. E. Bemis; "Constituents of the Leaves of Acer ginalla," by A. G. Perkin and Y. Ugeda; "Assay of Caffeine Drugs," by T. Ugarte; "Alkaloidal Content of Nux Vomica and Kola," by H. B. Weber; "Salicin Content of British Columbian Willows and Poplars," by R. H. Clark and K. B. Gillie; "Alkaloidal Content of the Rhizomes and Roots of Ipecac," by A. Viehoever and C. O. Ewing; "On the Nature and Composition of Irish Moss Mucilage," by P. Haas; "Study of Aspidosperma," by V. Dehrs; "The Acids of Ribes rubrum," by H. Franzen and E. Schuhmacher; "Phytochemical Notes," by J. Wheelan; "Chemical Studies of Veratrum," by A. Viehoever and J. F. Clevenger; "On Ergot," by A. Stoll; "Paniculatin, the Alkaloid of Aconitum paniculatum," by G. E. Brunner; "Hydrocyanic Acid Content of Mouldy Cherry-Laurel Leaves," "Hydrocyanic Acid and Saponin Plants," "Hydrocyanic Acid in Cornus sanguinea," and "Ratio between Total Nitrogen and Alkaloidal Content," by L. Rosenthaler.

Work on ash determinations has been carried on by a number of scientists. A leader among these is E. L. Newcomb who has published "Ash Yield of Buchu;" in connection with C. E. Smith and E. R. Hodel, "Ash of Cannabis;" and with C. H. Rogers, "Ash of Glycyrrhiza." Two other interesting papers are "Ash Content of Drugs," by H. Zornig and F. Adler, and "Determining the Ash of Rhubarb," by J. F. Liverseege.

Finally, among the articles dealing with the history of drugs, "The Drugs of Pegolotti," by Rosenthaler, and "History of Indian Hemp," by de Rosemont deserve especial mention.

The following list of references to papers on Pharmaceutical Botany and Pharmacognosy which have been published within the past year may be found helpful to the workers in these branches of science:

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PHARMACO-THERAPEUTIC INSTITUTIONS.*

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The great question before the American Pharmaceutical Association to-day is, how shall we promote progress in the science of pharmacology and the pharmacologic arts?

* Read before Scientific Section, A. Ph. A., Cleveland meeting, 1922.