A QUARTER OF A CENTURY OF CHEMICAL INVESTIGATION OF A TYPICALLY AMERICAN GENUS OF PLANTS.*

BY EDWARD KREMERS.

This unwieldy title might have been greatly simplified. However, if the title is to indicate the purport of a paper, this lengthy one fulfils its purpose better than a shorter one that might reveal more of the nature of the contents. As a matter of fact, the author is relatively indifferent as to its contents, but desires to lay the stress on the research. Indeed, much, very much, work has been done that could not be reported even if several hours were to be devoted to the subject. Thus biochemically, the quinhydrone hypothesis of plant pigmentation, which has been evolved out of these investigations, might alone demand an hour or more for a satisfactory presentation. The relation between plant perfume and plant pigment, or that between both and the enzymes, or that between the inorganic constituents and the organic pigment-forming compound, might be made the subject of other papers. Pharmaceutically, one might dwell on the development of a pharmaceutico-agricultural industry, the production of American thymol; or to point to a rational explanation of the difference between red and white oils of thyme, etc. All of these phases, interesting as each and every one has proven itself, are not so much in the mind of the writer as the emphasis which he desires to lay upon research in pharmacy, continued research, even when others think it is about time to quit and to take up new fields of investigation. The inexhaustibility of any field of investigation happily does not require proof or demonstration. The common sense of exhaustive research, however, may demand explanation. After the quinhydrone hypothesis of plant pigmentation had been evolved, what more could the investigator demand? After the possibility of the production of thymol and other products had been pointed out, why not leave the practical demonstration to others? After a quarter of a century of research, why not drop the subject and take up something new? For the simple reason that after this lapse of time the horizon has grown wider than ever before, and that the subject has become more intensely interesting than ever. For justification, let me but point to the recent discovery of a new terpene, or possibly more correctly of two new terpenes; to the synthesis of new dyestuffs; and to the study of intramolecular changes of isomeric derivatives. The economic possibilities I shall only mention.

About the middle of the nineties, four men from the University of Wisconsin took the early train west and returned that evening with four sacks of horsemint on their shoulders. Since then Monarda has been gathered by the ton and distilled: *Monarda punctata* from the sandy lowlands of the Wisconsin river valley and elsewhere, *Monarda fistulosa* from the clay soil about Madison, *Monarda didyma* from the Jersey hills, *Monarda citriodora* from Texas, Monardas from Missouri, Alabama and elsewhere. Correspondence has just been entered into for a new Monarda from Arkansas. Any one who will advise us where and how other Monardas can be secured in quantity, or who will supply us with seeds so that we may raise the plants ourselves, will assist in contributing another chapter to this biochemical study of a typical genus of American plants.

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With the exception of a preliminary study of the inorganic constituents and some work on the oxidase, the investigations have been practically restricted to those constituents that can be isolated from the bulk of plant material by steam distillation and can, by this simple method, be concentrated as the so-called volatile oil. The equally large, or possibly larger, field of non-volatile constituents has, as pointed out, been scarcely touched upon.

ADSORPTION MEDICINES AND SIMILAR REMEDIES WITH LOCAL ACTION.

BY H. R. JENSEN, M.SC., A. I. C.

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The author described new types of remedies used during the war, especially at the hospitals connected with the Liverpool Tropical School. At the outbreak of the war the best treatment known for the destruction of the amoebic parasite frequenting the large intestine, more particularly in the sub-acute form of dysentery, was the hypodermic injection of emetine. On the assumption that the prolonged—as distinct from the delayed—action of the emetine was the most important factor in dosage, Dr. H. H. Dale, F. R. S., introduced the use of emetine bismuth iodide, devised by Du Mez. This compound should be practically insoluble in the acid stomach, but in the alkaline small intestine free emetine is gradually liberated, and passes through for local action on the parasites in the large intestine, where it is dissolved by the fermentation acids. This is a mechanism analogous to that of salol. Du Mez' analysis of his compound, prepared by the addition of Dragendorff's reagent to a 1 in 300 solution of emetine indicated a composition (emetine), $(5HI)BiI_3$, with a content of 29 percent of emetine.

Concurrently with this use of emetine, Allan in America, and Professor Stephens at the Liverpool School of Tropical Medicine, made an extensive clinical study of the numerous cases of sub-acute dysentery, using a proprietary adsorption compound of "total alkaloids" of ipecacuanha in physico-chemical union with a hydrous aluminium silicate derived from a clay or fuller's earth, as devised by J. U. Lloyd. Chemically this compound reacts in the same way as the double iodide, being insoluble in acid solutions, and liberating alkaloids with alkalis. In 1917, in ignorance of the extensive American master patents in such remedies, the author prepared a new series of drugs, for which purpose, as they were not otherwise obtainable, a temporary license was issued to cover use in the Government hospitals.

PREPARATION.

The simplest method is by suspension of a suitable fuller's earth in a solution of the alkaloid salt or galenical extract. On shaking combination occurs at once, when the product is filtered off, washed and dried with special precautions. Adsorption is in general greater in aqueous than alcoholic solution, and in strong than weak concentration. In practice special technique is required to obtain a product of the great lability desired, with which decomposition will not be too slow. The earth should be selected with the highest degree of hydration, and usually with high iron and calcium content. The high initial adsorptive value required, which cannot be gauged by its well-known bleaching power, but may be related to the detergent quality, must be raised by a series of lixiviations to the greatest extent. In addition the concentration in which the drug is primarily dispensed in the adsorbent, as well as the degree and nature of after-dilution, are factors.

In addition to the points set forth in the printed abstract, the author also emphasized the possibilities of partial recombination before the separate portions of the adsorptions had finally left the body. He suggested that it would be interesting to observe to what extent alkaloids oxidized or reduced while adsorbed, and that it must be determined what the adsorbing ratios were with alkaloid solutions of gradually decreasing concentrations, as must the exact quantitative reactions of a saturated adsorption to solutions of other alkaloids.