

So if special research laboratories are to be established for the working out of Pharmacopoeia and National Formulary problems, or for coöperation in commercial problems, these should not be made final. There should be other courts of appeal. Altruistic labor has this advantage, that while it is usually less thorough in its work, it is more open in its acceptance of evidence.

The special and the coöperative research laboratories are very desirable. We can accomplish much through them. We should not distrust them nor cultivate a critical spirit, but we must not lose sight of the fact that science is the interpretation of known facts, and that all facts are not yet known, and that interpretations may not be infallible.

Commercial laboratories are doing much of unselfish altruistic work in research, and college professors are not lacking in sympathy and understanding of commercial conditions. This favors coöperation. It is a factor which the technical industries are beginning to develop systematically. Technical students are being delegated to industrial shops for a part of their college course, such experience being a part of the curriculum, required for graduation. And the industries are turning over some of their problems to the college laboratory for research. Such conditions are to be encouraged.

We shall arrive at more satisfactory and lasting conclusions by developing both motives in research than by trying to establish a single laboratory, however well equipped with men and tools, which shall pass final judgment on scientific questions.

BALLOTA HIRSUTA, BENTH.

AN ADULTERANT OF HOREHOUND (*Marrubium vulgare* L.).

BY CLARE OLIN EWING AND JOSEPH F. CLEVINGER.

Within the past two years a number of shipments of "Horehound," *Marrubium vulgare* L. offered for entry proved to consist entirely of the young herb of a spurious species, which was identified in this laboratory as *Ballota hirsuta* Benth. This finding was announced in Service and Regulatory Announcements, Chemistry 20, Item 212(1917), although no details were given, since at the time the Bureau had not adopted its present policy of including descriptive paragraphs regarding adulterants found in crude drugs. More recently there has come to our attention a shipment of horehound in interstate commerce which proved to contain approximately 25 percent of material from this same species. A sample was referred by the commercial firm interested to a consulting analyst, who erroneously pronounced it to be *Ballota acetabulosa* Benth., and not *Ballota hirsuta*. The two species resemble each other closely, and both so nearly resemble true horehound that it is not easy to point out striking macroscopic distinguishing characteristics, which are especially difficult to detect in the dried and crushed condition in which the material is imported. In view of the instance of confusion of the *Ballota* species above cited, as well as because of the substitution of a spurious product for horehound, it is thought that a brief statement of the chief differential charac-

teristics of the three species may be of interest. These data are based upon the examination of specimens in the National Herbarium of the Smithsonian Institution, Washington, D. C., and the New York Botanical Gardens, Bronx Park, New York City.¹

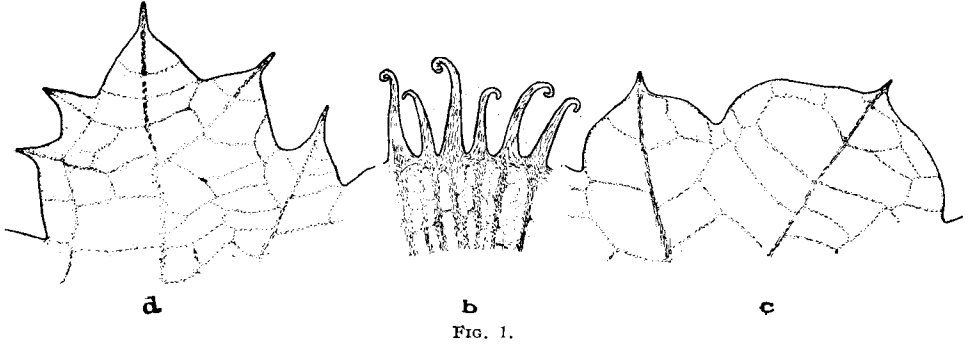


FIG. 1.

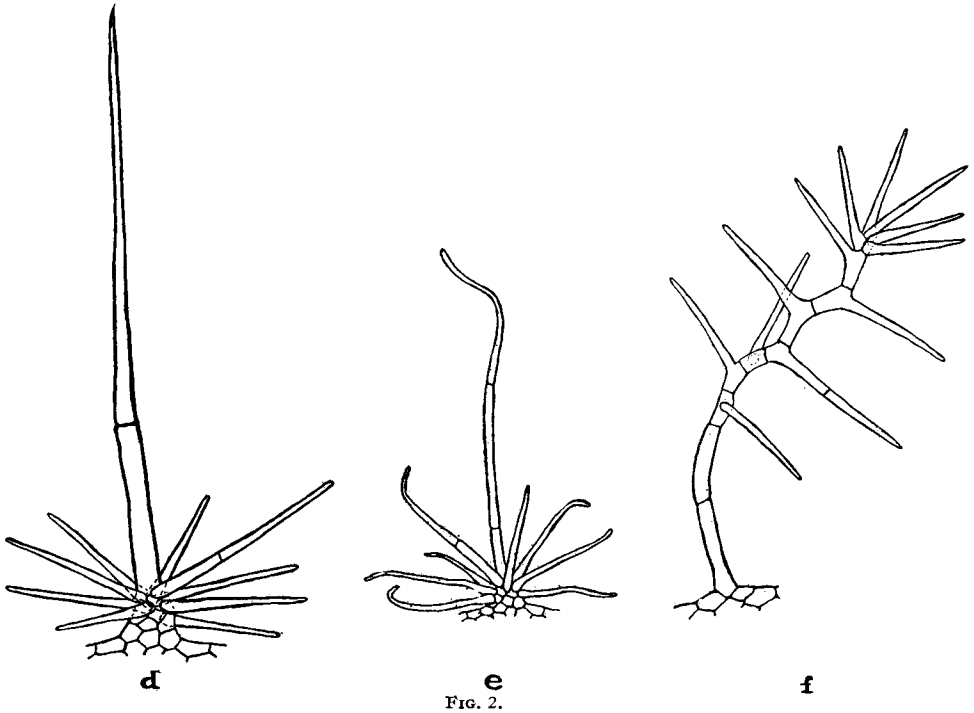


FIG. 2.

Differential characteristics of *Marrubium vulgare*, *Ballota hirsuta* and *Ballota acetabulosa*.

FIG. 1.—I. Calyx margins $\times 6$. (a) *Ballota hirsuta*. (b) *Marrubium vulgare*. (c) *Ballota acetabulosa*.

FIG. 2.—II. Characteristic hairs $\times 60$. (d) *Ballota hirsuta*. (e) *Marrubium vulgare*. (f) *Ballota acetabulosa*.

The leaves of the three species in question are so similar that examination with a hand lens does not enable one readily to distinguish between them. The herb, however, is nearly always collected in the flowering condition and the shape and lobing of the calyces of the flowers, which are generally fairly abundant,

¹ Specimens were kindly made available to the Bureau through the courtesy of Dr. N. L. Brittin, Director.

afford the most striking means of differentiation. The calyx of true horehound, which is only about half as large as those of *Ballota acetabulosa* and *Ballota hirsuta*, is tubular, whereas the calyx of both *Ballota* species is nearly funnel-shaped. The margin of the calyx of *Ballota acetabulosa* has 10 to 20 very obtuse lobes, in fact it is almost crenate (Fig. 1-c); this distinguishes it from the dentate margin of *Ballota hirsuta*, which has 10 to 20 acute lobes (Fig. 1-a); in both species the lobes terminate in very short nearly awl-like teeth barely one-half cm. in length; both thus differ markedly from *Marrubium vulgare*, which, as is well known, has 10 awl-shaped recurved teeth about 2 mm. in length (Fig. 1-b).

Under the microscope the leaves of *Marrubium vulgare* show tufted hairs, which are usually curved or bent and almost sessile (Fig. 2-e). Those of the leaves of *Ballota hirsuta* are usually straight and are somewhat elevated by a multicellular basal stalk (Fig. 2-d). In both cases one hair generally attains a considerably greater length than the others and may contain 2 or 3 cells; this elongation is perhaps more frequent and pronounced in *Ballota hirsuta* than in true horehound. The tufted hairs of *Ballota acetabulosa* have a long, oftentimes much bent central stalk, from which many straight hairs branch (Fig. 2-f). Other types of hairs are present on the leaves of the three species, but they are not especially characteristic. The non-glandular hairs in the throat of the calyces furnish another microscopical characteristic which distinguishes both *Ballota species* from true horehound. In the former these hairs contain tiny prismatic crystals, presumably of calcium oxalate—they are insoluble in acetic acid and soluble in hydrochloric acid. The hairs in the throat of the calyx of *Marrubium vulgare* show no crystals.

No chemical data regarding *Ballota hirsuta* appears to be available in the literature, and it is therefore impossible to state whether it might be valuable as a substitute for horehound in the manufacture of cough drops or other medicinal preparations. It has, however, an agreeable odor and may possibly be a desirable material for use in the manufacture of confectionery. Its similarity in odor to true horehound seemed so striking that for purposes of comparison a small amount of candy was prepared from an infusion of the material. The flavor was not at all unpleasant and very closely resembled that of a candy similarly prepared from genuine horehound.

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THE CULTIVATION OF MEDICINAL PLANTS.*

BY GEORGE P. KOCH.

War with all its horrors, and terrible as the results may be, does produce some good. It stimulates production, compels efficiency, and teaches us to be more self-reliant.

This applies to every phase of our national life, and one of the results of the great world war has been to teach the United States how it may produce the supply of medicinal drug plants necessary to its health and life.

* Read before Philadelphia Branch, A. Ph. A., February meeting, 1919.